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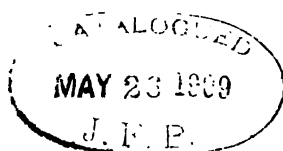
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No. 1.

ELECTRICITY IN JOINT AFFECTIONS.*

BY HENRY W. FRAUENTHAL, A. C., M. D., NEW YORK.

Physician and Surgeon-in-Chief of the Jewish Hospital for Deformities and Joint Diseases.

In the vast fields of science as in the development of a new country, it is the work of the pioneer whose efforts and energies direct the vast army that follow—what districts and fields are most fruitful in return for labor and time expended.

So, too, do those whose labor in special lines of medicine and surgery select the best from their scientific investigation to give to the vast army of general practitioners to use in their multitudinous labor in their daily work.

It is especially true in the increased field of usefulness that has been found for electricity with the X-ray and radio-active bodies in the past ten years.

I am restricting the scope of this paper to the use of our electrical armament in the diagnosis and therapeutical treatment of affections in and about the joints of the human body.

I merely wish to present my own clinical experience together with the work of other observers that pertains to this restricted branch of electrical therapeutics, and by these results and findings to excite the interest of still other workers, knowing that they will secure quicker and better results in acute and chronic inflammation of joints, save suffering and expedite cures.

1. The X-ray has been of the greatest value in the determination of fractures that extend into the joint.
2. Subluxations of the joint.
3. Malformation.
4. Hypertrophic and atrophic bones at the point of articulation that change the normal function of the joint.
5. The various acute and chronic inflammations of the joint.

* Read at the Sixteenth Annual Meeting of the American Electro-therapeutic Association at Philadelphia, September 19, 1906.

6. The appearance of the synovial sac.
7. The presence of foreign bodies, loose pieces of cartilage.
8. The sesamoid bones that develop in the tendons or ligaments of the joints and are sometimes taken for foreign bodies or fractures.

Thus the X-ray gives us an ocular evidence that could not have been previously determined as accurately and in many cases not at all.

The X-ray photo of a joint should always be taken in two directions, the one at right angles to the other, and the distance of the tube specified.

In the present paper I will merely take up the most common forms of arthritis, i. e., tubercular, gouty, syphilitic, gonorrheal, atrophic and hypertrophic arthritis; the latter being generally classified under the meaningless term of rheumatoid arthritis.

It is the intention of the author to make each of the forms of arthritis the subject of a separate paper in the future.

Among the first observers to use electricity in the treatment of joints is R. Remak, 1856—later Danion (in his "Traitement des Affections Articulaires par l'Électricité," Paris, 1887, page 238) describes his success with this therapeutical measure.

Leduc, in the Arch. d'Électricité Médicale, 1894, page 478, and in subsequent writing describes in scientific detail his personal success in the treatment of arthritis with electricity.

C. Leo V. Marano, M. D., Australasian Medical Gazette, July, 1890, reports several cases of arthritis treated by electricity and says: "In subacute and chronic cases, however (mono- or poly-articular chronic rheumatism, arthritis deformans, stiffness of the joints following sprains, dislocations, or fractures near the joints, periartritic swellings and the like)."

Electricity stands unrivaled, and if you consider for a moment the *modus operandi* of each remedy ordinarily employed and that of electricity, you cannot help seeing the latter's superiority.

Dr. F. W. Gwyer in an article on the treatment of fibrous ankylosis in the Annals of Surgery, August, 1893, gives an account of the use of the galvanic current in the treatment of several cases of ankylosis. The pain was immediately relieved, the range of motion increased, and part of the fibrous tissue absorbed.

Tubercular Arthritis.

In tubercular arthritis we may have the primary point of tubercular invasion in the synovial sac with its thickening and extension into the other tissues of the joint, or we find that it originates in the ends of the long bones and extends to the cartilage.

By means of the X-ray the points of tubercular disintegration necrosis can be detected and the advisability of operative interference determined; by these means the treatment may be materially aborted.

Chanoz and Leveque, *Essai de Traitement des Arthritides Tuberculeuses* (Arch. d'Électricité, 1903, page 264) have reported three cases in which the direct current proved valuable in cases of tubercular joint trouble.

In one of these Leveque was himself the patient, and the results of treating his own knee for tubercular hydrarthrosis were perfectly satisfactory to himself. In two other cases the joints treated were notably improved. The current used ranged between 20 and 50 milliamperes.

The following citation from an extract by Dr. John B. Murphy, in *JOURNAL OF ADVANCED THERAPEUTICS*, 1903, pages 250-252, shows a great stride forward in the use of the X-ray for therapeutic purposes in tubercular joints.

"The X-ray is not only an aid in making a differential diagnosis in these cases, but it is also an aid as a therapeutic agent in tuberculosis of the bones and joints. I have had a very gratifying experience with it in two cases of tuberculosis of the knee-joint involving the synovial membrane. They were injected without producing the desired effect. The X-ray was then used, and one case in which the effusion had existed for nine months, was discharged from the hospital twenty-one days after admission without a particle of effusion or the slightest diminution in the range of motion of the affected joint. I never got such a result before where I simply injected the mixture of formalin, iodoform, and glycerin. By putting on the X-ray and stimulating the production of new tissue, as we know the X-ray does, there was almost immediate restoration of the synovial membrane to its normal functions of secreting and absorbing so that there was not a particle of retained effusion in the joint.

"Not alone in this type of tuberculosis of bone has the X-ray shown its striking features, but I also have three cases of tuberculosis of the spine in which its use was followed by the most

striking and gratifying results. Tuberculosis of the spine is frequently accompanied by a paraplegia. That paraplegia has heretofore been attributed to the kyphosis and the compression produced at the point of bending. Now we know that it is not the deformity of the bone at all that produces the paraplegia, and that the compression occurs in the posterior portion of the cord, and not the anterior, as would be the case if the bending was the cause of the trouble. When the tubercular condition ruptures through the compact bone it forms a granuloma within the spinal cord, and it is this granuloma that produces the compression of the cord and the paraplegia in the parts affected.

"The question came up in Victor Horsley's citation of his cases of tuberculosis of the spine. He went in behind this granuloma, curetted the body of the vertebra, doing a laminectomy, opening not the dura but the spinal canal. He made a curettement and in that way relieved the pressure. I have done that operation for the relief of pressure three times, twice with good results and once with a failure. It was this particular case in which the operation failed to give the expected relief that led me to the use of the X-ray for its therapeutic effect in just this class of cases. You will pardon my citing a case, but I cite it because it is a forcible one in illustrating the use of the X-ray in this very hazardous lesion; hazardous, because it hinders walking.

"The patient, aged thirty-six, a farmer, was lifting a hog from a sling, when he suddenly felt a pain at about the fifth dorsal vertebra. The pain gradually increased in severity, although he was able to be about for a week. I saw him thirty-eight days after the accident, as he called it. He said that he did not fall down when he had the pain, nor did he drop the hog, but he carried it to the place in which he had originally intended it to be. When I first saw him he had a beginning paraplegia from the point of the injury down. I could not believe that a tuberculosis of the spine originating in an adult could advance with such rapidity as to produce a granuloma sufficiently large to compress his cord in that short period of time. Consequently I made a diagnosis of sarcoma. Besides we know that an osteosarcoma following trauma can develop with that rapidity.

"With a large hypodermic needle I made a lateral puncture in between the ribs, through into the pleural cavity and into the body of the vertebra, and succeeded in getting a drop of pus and tubercular débris. Dr. John Deaver, of Philadelphia, saw the case with me and confirmed the diagnosis. The next question was,—what could we do for that man other than to do a laminectomy to stop his rapidly advancing paraplegia. After a thorough consideration of the subject I decided to put him on the X-ray treatment. The first few days after the application of the ray his pain disappeared, and after twenty-five applications his paraplegia had entirely disappeared and he was

able to go home; and to show you how thoroughly it disappeared, he went hunting, shot chickens, and incidentally shot off a part of his foot. I used the X-ray to hasten the healing of his foot.

"The second case was one on which I had performed a laminectomy a year before. There was absolutely no improvement, in fact, he was worse after the operation than before. There was already a mixed infection at the time of operating. There had been a number of discharges of fragments of bone in the year that had elapsed. I curetted, but without any result, and I finally put him on the X-ray to heal his bone tuberculosis. Twenty-one applications of the ray closed it up, so that instead of having a rather profuse discharge there now was none. It did not help his paraplegia nor did we expect that it would, because his cord had been destroyed by the tuberculosis and the mixed infection which had been present from the beginning.

"The third case was a patient (paraplegia) suffering intense pain, taking one-third of a grain of morphine every two hours to secure partial relief, on account of the increasing pressure of the granuloma on his cord. He was unable to move and was confined to bed all the time. He was put under the X-ray. The first two applications, and that is one of the peculiarities of the X-ray, stopped his pain, and although it did not remove the tumor, yet it stopped its rapid growth. I received a report from that patient to-day. He had had twenty-three applications of the ray and is now walking about on crutches. From the second day of the application of the ray he has not had a hypodermic of morphine. I think, I can safely say that the prognosis in this case is exceedingly good."

In the past five years I have divided my cases of tubercular arthritis of the spine, hip, knee, etc., into two divisions, each of equal severity as the other with the patients of the same relative natural resistance.

In the one-half which has received electrical treatment, i. e., X-ray, high-frequency, and the continuous current. The duration of the time of treatment was reduced one-half while the pain was relieved almost immediately in most cases, and nature's functions were stimulated and aided into a more rapid resolution.

In the past year I have added these electrical therapeutical measures to the sunlight, diet (Biers), passive congestion, therapeutical exercise of the body, and mechanical protection to the joint, aiding with psychical suggestions to encourage pa-

tient and parent. Thus using all that I can command to bring about the quickest and best result from my tubercular patient.

Gout.

A paper was read at the International Medical Congress in Berlin in 1890 on Mr. Edison's experiments on the removal of gouty concretions by electrical endosmosis (cataphoresis). As an illustration one hand of a healthy man was placed in a solution of chlorinated lithia, the other in one of chlorinated soda. The latter was connected with the positive pole and the former with the negative. A current of 4 ma. was passed for two hours a day, eleven hours in all.

Spectroscopic examinations on the urine showed considerable quantities of lithia had passed into the man's body. Experiments were now performed upon gouty patients with apparently successful results. The pain ceased and the gouty concretions diminished in size. A local bath should be prepared containing a 2-per cent. solution of lithium chloride. This should be rendered slightly alkaline by the addition of caustic lithia of a strength of 0.5 per 1000. To this solution the positive pole should be connected.

The affected part being immersed in the bath, the negative pole should be attached to a very large indifferent electrode.

A strong continuous current (50 to 150 ma.) should be kept up for half an hour. The larger the negative electrode the less pain will be felt.

Lithium urate will be found in the urine.

Dr. Baynes in *Medical Electrology and Radiology*, April 1, 1904, pages 173 and 177, says:

"As phoresis plays so important a part in the local treatment of joint affections, I may be excused if I describe it in detail.

"By phoresis we mean the introduction, or passage of fluids, or crystalloids, through a tissue (such as skin or mucous membrane) or porous septum by the agency of the galvanic or static current. Galvanic phoresis includes two distinct and separate phenomena known as anaphoresis and cataphoresis, and is either one or the other as the diffusion takes place from the anode or from the cathode.

"It is found by experiment that some drugs are carried into the tissues more rapidly than others; for instance, the diffusion of alkalis is much more rapid than that of the acids, so also some alkalines are diffused more quickly than others, and the same may be said of the acids. Phoresis is practically an elec-

trolytic process, as the drug acted upon by this method is broken up into its elements, some going to the negative pole and some to the positive, according as they are electro-negative or electro-positive. This action necessitates a classification of drugs into electro-positive and electro-negative. The following are a few of the drugs or medicaments that come under the class electro-positive alkalies as a rule; hydrogen, potassium, sodium, copper, zinc, cocaine, gelsemium, jaborandi, ichthyol, iodoform, etc., and of course all these have a strong affinity for the negative pole. Among those classified as electro-negative I may mention the following: the acids, or what takes the place of an acid, chlorine, nitrogen, iodine, fluorine, sulphur, and many others.

"These manifest a strong affinity for the positive pole. When dealing with binary compounds—by these I mean such drugs or medicaments as are composed of two elements, a base and an acid, we find that the base is electro-positive and the acid, or what takes its place, is electro-negative. Take, for example, cocaine hydrochlor.; here cocaine is the base, and as stated above in binary compounds, the base is electro-positive and must be applied by or from the positive pole, which repels and transfers it to the negative pole. But suppose instead of cocaine hydrochlor., we are dealing with iodide of potash. In this case the iodine taking the place of an acid is electro-negative, and must be applied by or from the negative pole, which will repel and transfer it to the positive. We may therefore formulate the following rule, which in practice will be found to be fairly accurate, viz., in binary compounds the base of the salt must be introduced by or from the anode, whereas the acids, or what takes the place of the acids, must be introduced by or from the cathode. Now as the dose or quantity of current required in phoretic applications and the duration of each sitting depends to a greater or less extent on the amount of work to be done, each case must be treated on its merits, although always bearing in mind that if too strong currents are used, or if continued too long a time, the acids of the body will accumulate to such an extent, at the anelectric zone, as to nearly, if not entirely, destroy the drug, and thus neutralize its effect.

"The following experiments conclusively prove (a) that drugs can be introduced into the system, even in poisonous doses; and (b) that electro-negative medicaments have an affinity for the positive pole, and must be applied by the cathode, which repels and drives them towards the anode, while, on the other hand, electro-positive substances must be applied by the positive pole for a similar reason. For instance, we take two carbon electrodes, covered with absorbent cotton wool connected with a galvanic battery, soak them in a solution of methylene blue and apply them to the arm or any part of the body. Now if a current of from 10 to 15 ma. be allowed to

pass for from 15 to 25 minutes, and the electrodes be then removed, we will find that the methylene blue beneath the anode has entered so deeply into the pores of the skin, that it cannot be removed by washing, while the stain beneath the cathode is easily wiped off. The coloring matter, in thus leaving the anode and seeking the cathode, has passed into the skin, and must be electro-positive, and the action is cataphoric. But if, instead of methylene blue, we use a solution of eosin, the permanent stain takes place below the cathode; eosin is therefore electro-negative, and its action is said to be anaphoric."

Prof. Leduc's experiments with rabbits are very instructive. He took two rabbits and connected them together, using for the connecting electrode simply a saline solution, on the outer side of each rabbit he applied an electrode soaked in a solution of sulphate of strychnine. A short time after the current was turned on, the rabbit in connection with the positive pole died, being poisoned by the strychnine, while the second rabbit was unharmed, it, being attached to the negative pole, only received the sulphuric acid of the solution. Dr. Leduc then removed the dead rabbit and substituted a living one in its place. He then repeated his experiment, but this time used cyanide of potassium, with the result that the rabbit connected with the negative pole died, being poisoned by the hydrocyanic acid. The other, only receiving a certain amount of potash, did not suffer any harm.

However useful galvanic phoresis may be, it is only applicable to watery solutions of drugs. When, therefore, we wish to obtain the phoretic effects of gaseous, volatile, or volatilizable substances, we must have recourse to the static current. This is carried out by means of hollow cylindrical or globular electrodes, at one end of which is a discharge brush, connected with the machine and so regulated that it can be pushed forward or backward and thus brought nearer or further from the opposite end of the electrode which is open and in contact with the skin. Pellets of cotton wool soaked in the volatile medicament, such as salicylate of methyl, are placed in the tube at the open end, which is then put in intimate apposition to the part to be treated.

In the case of such a substance as mercury, the drug must first be volatilized by heating it in a retort, the vapor being carried from the retort to the electrode by rubber tubing, which fits over a perforated glass nipple connected with the electrode.

Gases are introduced into the electrode by rubber tubing from a stopcock attached to the jar or pipe containing the gas, to the glass nipple opening into the electrodes.

During the process of static phoresis the patient must be on an insulated stand attached to the negative pole.

The therapeutic possibilities of this method of phoresis are very great, and the known beneficial results in (phthisis), tuberculous joints and glands; gouty, rheumatic, and arthritic joints, ulcers, unhealthy sores, sinuses, many affections of the nasal and other cavities and certain skin diseases, etc., are such as to warrant fuller investigation.

For static phoresis it is absolutely necessary, in order to ensure perfect penetrations, to use instruments that run at a very high rate of speed.

Having considered the general aspect of the electrical treatment of these affections, I propose now to say a few words on the special technique to be followed in gout and rheumatism.

Gout.—Here we have to deal, roughly speaking, with a condition of faulty or retarded matter, resulting in an excessive production and retention or accumulation of uric acid in the system, which in turn produces or is converted into the urates of soda and lime. These salts are exclusively insoluble, and though they may be deposited anywhere in the body are usually found in and about the joints and are known as tophi.

The general or constitutional condition and defective metabolism may be most successfully treated by either high-frequency currents, or galvanism, employing currents of great intensity, after the plan suggested by Guilloz. This method is carried out by applying large, well-covered electrodes over the abdomen, thighs, buttocks, and loins. The electrodes attached to the negative pole should be somewhat larger than those connected to the positive; they must be thoroughly moistened. The strength or intensity of the current is gradually carried to 150 ma., beginning with 80 ma., then raising it to 120, returning to 100, and so on till the patient can bear 150 ma.; sometimes even 200 can be reached. These applications are continued for 20 minutes at first, but eventually the sitting may be continued for half to three-quarters of an hour. If the skin gets tender, shift the position of the electrodes.

The increase of urea, uric and phosphoric acids found in the urine after a few days' application of the high-frequency cur-

rents is very marked. The plan I usually follow is to apply these two forms on alternate days. The improvement in the patient's general health is very great, after even one week's treatment. The technique of the local treatment may be carried out in one of two ways, either by pledgets of blotting paper, lint or absorbent cotton soaked in a strong solution of iodide of potash. One such pledget to be placed on either side of the joint to be treated. Over each of these pledgets a small flexible metallic electrode is placed. These are connected with the anode and the other with the cathode of a galvanic battery. The current is now turned on, as strongly as the patient can comfortably bear. The iodine of the pot. iod. will enter the joint at the anode, while the potassium will enter at the cathode after three or four minutes, or in the case of the knee-joint, five or six minutes. Reverse the current, and the side of the joint that was receiving the iodine now gets the potash, and the side that was treated with the alkali (potassium) now receives the acid (iodine).

Another method is by filling an earthenware jar with a solution of one of the salts of lithia. A carbon electrode connected with the positive pole of a galvanic battery is placed at the bottom of the jar. The affected joint is then immersed in this solution, the circuit being closed by large well-covered electrodes, which are placed on the back or buttocks. Very strong currents can be used in this manner, varying from 50 to even 200 milliamperes. The above is the technique employed in the treatment of most forms of arthritis, gouty rheumatoid, rheumatic, etc. For tuberculous and scrofulous joints static phoresis is often to be preferred, as by this method mercury and other substances, impossible to manage by galvanic phoresis, are easily introduced into the joints.

Sparking from an influence machine or from high-frequency current apparatus has an excellent tonic effect in some joint affections.

As the time limit will not permit a continuance of this subject, I will refer you to the author's paper on Gonorrheal Arthritis and Syphilitic Arthritis, and the papers on Rheumatoid Arthritis by Dr. Snow, Dr. Margaret Cleaves, Dr. Francis Bishop, and others.

If an apology is necessary for introducing material quoted

from other authors, I think its character is worth the time I have occupied with it.

I think that there is a concurrence of opinion as to the value of electricity to alleviate pain, to aid in the absorption of pathological material, and to expedite the return of joints to their normal function.

That the results are quicker and better than those heretofore obtained by other methods.

I do not mean that electricity in its various manifestations should be used to the exclusion of other medical means, but it will be of material benefit when it is added to them.

The X-ray and high frequency have no rivals for the prompt relief of pain. Together with the continuous current they promote absorption of joint effusions; while the X-ray inhibits tubercular and other forms of bacteriological life, and thus assists nature in furnishing resistance to their progress.

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Discussion.

Dr. G. Betton Massey: We should understand a little more clearly that the substances that we drive into the tissues are driven in as ions, and not as compounds. It is likely, in other words, that iodine itself, rather than the iodide of potassium, is the substance driven in at the negative pole by anaphoresis. In fact, this has been practically proven. It is therefore unwise to reverse the poles, as mentioned by the reader of the paper, as the effect is then to compel the iodine that has been driven through the skin to retrace these tissues, it being driven out when the positive pole is active.

The real problem is to introduce the iodine at this, negative, pole with a workable irritation of the skin. This problem is lessened by attention to the detail of a good electrode covering, or a means of distributing the lines of force evenly over the surface. An excellent plan is to construct a pad of three layers of absorbent cotton covered with gauze, and backed with a smaller piece of the thinnest X-ray metal. These may be sewed together with an ordinary needle and cotton. To this metal a piece of No. 28 copper wire is attached as conductor by threading it through tiny holes in a corner and turning the metal over the wire several times. A mixture of Lugol's Solution and water makes an excellent solution for this pad.

An important necessity in all phoretic applications is to give ample time for penetration. In minor cataphoric applications in cancer we would fail without thirty-minute applications.

Dr. Edward C. Titus, New York City: I am scarcely prepared to discuss the paper, except with regard to the results

from X-rays. I think the effect upon morbid tissue is to retard its development, thus giving the normal tissue an opportunity to increase and take the place of the tissue of lessened vitality. The results in tuberculosis are obtained in this way. With an increased enzyme activity we get an increased action of the nerve tissue, and that depending upon the degree to which the ray is employed. If we continue the use of the X-ray beyond a certain point we likewise lessen the resistance of the normal tissue. So it is the proper knowledge of the application of a sufficient dose to arrest these morbid conditions that gives the normal processes an opportunity to recover themselves, and obtains the best results. The absorption of adhesions is brought about in the same way.

Dr. Thomas W. Brockbank, Philadelphia: I have never felt convinced that the static current was very valuable in cataphoresis, but I believe that in this the constant current is the one of choice. In reference to the possibility of stimulating normal growth by the application of the X-ray, I have never felt that it was a constructive agent. There might be a rare possibility that the mildest application due to a slight irritation at first stimulates to physiological action, but if that is the case we would not use the ray in sufficiently strong dosage to affect abnormal tissue. When we go far enough we bring about destructive action. When we do not go beyond a certain point we permit the normal tissue to take on better vitality, not from stimulation, but from a better opportunity from destruction of the morbid growth.

Dr. M. M. Johnson, Hartford, Conn.: There is without doubt a stimulating action of the X-ray; in fact the first effect of the X-ray is that of a powerful stimulant, when long continued it is destructive, as is shown in the treatment of morbid growths. When we want the stimulating effect the exposure must be short. I can illustrate this by a case of chronic rheumatic periostitis of the feet, in which the soles of the feet were so tender that the patient could not walk without crutches. The patient was in skillful hands but for months there was no improvement.

I considered this a case requiring a stimulating action to overcome the morbid condition. I commenced using the X-ray on the soles of the feet with three-minute exposures every second day. Improvement followed this treatment, and in three weeks the patient was able to lay aside her crutches and went on to recovery.

Dr. John H. Burch, Baldwinsville, N. Y.: Except in tuberculous conditions I have used the X-ray only in the matter of diagnosis. I think it is of much value in the tuberculous cases. Little mention was made of the high-frequency current, but I regard it as a valuable modality in this class of cases. In joint conditions I have used iodine which I am sure can be driven

in, because it can be detected in the saliva and urine. I have had very little experience with galvanism, but feel that much can be accomplished with the high-frequency currents.

Dr. Frederick De Kraft, New York City: I have had experience with two cases. One was a man with a bad ankle-joint showing a mass of induration, and he had been unable to walk without a cane for twenty-four years. I used the X-ray five times for an average duration of 12 minutes. This set up a slight dermatitis, and when that disappeared the swelling also disappeared. One of the first cases in which I have known the X-ray to remove inflammatory deposits around a joint was that of a man who had fallen from an electric light pole and broken the lower end of the tibia and injured the bone of his right ankle. I used an eight-plate static machine to take some pictures in different positions and upon different days so as not to expose him too long at a time. I was astonished that the man did not come back to see his pictures, but meeting him on the street one day he told me that the pain he had had in that joint for two years had disappeared, and the next time I saw him the joint had become much less in size. This was in 1896, and though the man weighs three hundred pounds, he has had no pain or discomfort since.

I have also had a number of cases of acute synovitis with effusion which have been rapidly improved by passing the D'Arsonval current from the static machine through the joint. This sets up an intense hyperemia which causes absorption of the effusion. I do not believe we can get cataphoresis with the static current. The high-frequency current is another matter.

Dr. Sinclair Tousey, New York City: I am able to corroborate every word that Dr. Frauenthal said in regard to the beneficial effect of the X-ray in cases of tuberculosis of the spine and other joints. I have had two or three cases of chronic sinus in the back from tuberculosis of the spine which have been cured by the application of the X-ray combined with high-frequency currents. The X-ray, I believe, does have a stimulating effect when applied very lightly. From my own experience and that of others I know that one or two applications of the X-ray in cases of alopecia produces a stimulating effect upon the hair follicles, and sometimes only a very few applications will cure the condition.

The cases in which the X-ray is used for its destructive effect are those of tuberculosis and cancer.

The dose as to intensity, duration, and frequency of the application must be regulated according to the susceptibility of the tissues. There are some physiologically normal tissues which are noticeably susceptible to the effect of the X-ray. The effect upon the more susceptible abnormal tissue is a cumulative one, and we have to time our doses and so exert their intensity

that while the abnormal tissues do not completely recover between the doses, we feel sure that no cumulative effect is produced on the healthy tissues. The healthy skin should recover from the one application before we make the next one, while the unhealthy tissues do not, and eventually, we have the destruction of the tubercular or cancerous elements without a destruction of the healthy tissues.

The X-ray is wonderfully useful in the diagnosis of joint diseases and these cases of rheumatoid arthritis. If we find, as in a case of my own, that the joint is completely solid we can probably arrest the process but cannot hope to restore mobility. The main object of the treatment would be to save the joints which have not become involved in this formation of new bone. The X-ray is valuable in the treatment of some of these cases of rheumatoid joints where the high-frequency currents fail. I do not use the X-ray as the sole treatment of rheumatoid arthritis. I use the high-frequency currents, but occasionally a joint which does not respond well, will after a vigorous application of the X-ray yield to the high-frequency currents.

Dr. J. D. Gibson, Denver: Those of us who heard the paper three years ago of Dr. Murphy of Chicago upon the treatment of tubercular joint conditions and conditions of the spine remember that it awakened a great deal of interest, and in this paper the doctor refers to the wonderful influence of that contribution.

Mention is made in the paper of the relief of a case of a man who had had his foot shot off and who went home and healed it with the X-ray and that he got better results than he could have secured without the use of the X-ray. The expression of "healed it with X-ray" struck me as a rather peculiar one.

I do not think anything is better proven in medicine than that the X-ray is of inestimable value in tubercular conditions of the joints and in almost all chronic inflammations.

I do not like the expression of using the X-ray for tubercular conditions the same as you do for cancer. You have two absolutely different conditions to contend with. In cancer you want to destroy; we expect to destroy, to produce inhibition of the overgrowth. In tuberculosis you want a stimulating effect. You certainly would not give the patients treated for tuberculosis as strong treatment as for malignancy.

I am much interested in the doctor's paper, and his results are excellent. I believe that all tubercular bone conditions are going to be treated by X-ray instead of by medicine and so many operations.

Dr. George Z. Goodell, Salem, Mass.: I would like to ask the doctor what chances for recovery there are in a tuberculous joint of three years' duration.

Dr. Frauenthal (closes) : I think Dr. Titus covered about all that I want to say. In any physiological process into which pathological processes are introduced Nature offers a resistance. If you inhibit, as the X-ray does in tuberculosis or malignant disease, the process is arrested in a measure and I think a step further is taken in the production of a retrograde destruction. Nature then comes in and by an active process which she was unable to exert before on account of the local foci, furnishes material for a healthy process. Stimulation, I think, is what really takes place. It has been proven to me that by short exposures at intervals of from four to five days we give Nature a chance to resist.

With reference to introducing mercury into the tissue, I have never given it in any way except by instillation. I think it is difficult to prove that it can be given satisfactorily through the tissues.

Regarding the case of tuberculous joint of three years' duration, I think such a case would be benefited.

In answer to the gentleman who spoke of the high-frequency current, I think it is the best treatment for pain.

I will pass around some X-ray pictures of atrophic and hypertrophic arthritis. In one case of atrophic arthritis the woman had not walked for five years. At the first treatment she had to be carried into my office; now she walks with no difficulty.

I give a short exposure for six or eight days. A strong current and high intensity are needed. One has to investigate for himself to ascertain how much X-ray must be used to get the best results.



THE TREATMENT OF LUMBAGO AND OTHER PAINFUL CONDITIONS OF THE MUSCLES OF THE BACK.*

BY THOMAS W. BROCKBANK, M. D., PHILADELPHIA,

President, Pennsylvania Society of Physico-Therapeutics ; Member American Electro-Therapeutic Association.

Mr. President and Fellows :

In casting about for a subject for a paper for presentation to and discussion by this association, I have not aimed to report some rare pathological condition or to describe some new heretofore untried original methods of treatment but, on the other hand, I have taken for my subject a condition with which every practitioner, whether in general practice or doing special work, is familiar.

I have done this for the reason that I believe a larger amount of good can be done and much more of human suffering relieved by being able to successfully treat the everyday common ills of life than can come from the correct diagnosing and successful treatment of some rare affections.

Lumbago and other painful conditions of the muscles of the back may be looked upon more as a local manifestation of a general systemic toxemia than as a special and distinct disease with a pathology peculiar to itself, although the local symptoms are often so urgent as to call for special treatment for the relief of pain even before any steps have been taken to eradicate the underlying causes.

In all cases of lumbago there is a marked disturbance of the metabolic processes, especially on the part of nutrition and elimination carried on by the liver and kidneys. In other words, there is suboxidation and a consequent retention in the blood and tissues of the body of large quantities of toxic material.

Lumbago is divided into two types, namely chronic and acute. I placed the chronic form first because in my experience all or nearly all cases of acute lumbago are preceded by the chronic type. I arrive at this conclusion from my experience in treat-

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Philadelphia, September 19, 1906.

ing a larger number of persons in whom on a careful examination of the muscles of the back I have found marked and well-defined areas of pain on pressure when the patients had not complained of any special pain as an annoying symptom; merely stating when questioned on the subject that they tire easily when required to stand long or walk a great deal, or saying that they feel stiff at times.

Often they express great surprise when I locate these painful areas. For several years past I have made it a regular routine practice to examine the backs of patients for these painful points and at first I was much surprised to find so many cases where it was present, but now I am rather surprised in most chronic affections not to find these conditions present.

Onset.—As may be gathered from the foregoing chronic lumbago is of gradual development, coming on so slowly that the patient often fails to give it much attention until suddenly, as the result of exposure to sudden changes of weather, dampness, etc., an acute attack is ushered in.

The acute attack usually comes on suddenly and is often so severe as to totally incapacitate the patient.

It may come on while at his work or during the night. The pain is usually very severe, especially on motion or in an attempt to stand erect. If the patient is able to be out of bed he usually assumes the sitting position with the trunk bent forward in order to relax the muscles of the back. If in bed he lies on his side with his limbs drawn up and the head and shoulders bent forward. On examination we will find the affected muscles contracted and rigid. Pressure over these muscles causes great pain. There is often marked congestion and local heat caused by blood stasis as the result of disturbance of the circulation. There is frequently tenderness over the liver and constipation is the rule. The urine is scanty, high-colored, highly acid with the elimination of solids much below normal. In many cases the daily quantity of urine does not exceed thirty-two to forty ounces in the twenty-four hours, and elimination through the skin is often very much below normal.

Examination.—In making an examination for painful areas in the back the patient should lie prone on a suitable table while all articles of clothing should be removed from the body as low as the hips so as to give a good view of the back. By this means

it is possible to note contractions, atrophies, and other deviations from the normal. The posterior spinous processes should be carefully noted in order to determine whether or not they are in perfect alignment, it should also be noted whether the heads of the ribs are in proper position, because by severe muscular contraction they are sometimes forced out of proper position, thus causing marked pain by pressure and tension.

Deep pressure should be made over the different muscles and along both sides of the spinal column as much valuable information is often obtained in this way.

A differential diagnosis must be made from painful conditions of the kidneys, diseases of the spinal cord and neuritis affecting the intercostal nerves, etc. With ordinary care this is not difficult.

Treatment.—The indications for treatment are twofold, first, for the immediate relief of pain and, secondly, to correct the systemic condition which is the underlying cause.

The treatment of lumbago by drugs, particularly the relief from painful conditions, has not by any means been satisfactory as you may well believe on perusing any of the standard works on treatment, and noting the large number of remedies which the author states might be tried, none of which he speaks of with much confidence. In the treatment of lumbago the physico-therapist is indeed fortunate at having at his command several methods any one or any combination of which he can look to with perfect confidence, and he may with safety assure his patient of at least speedy relief from the acute symptoms and ultimate cure of the whole trouble.

These modalities range all the way from the hot domestic sad-iron to the static spark or the high-power incandescent lamp.

In treating these painful conditions of the muscles of the back I have my patients stripped to the waist and lying prone on a suitable table. I then begin at the base of the skull with the thumb on one side and the middle finger on the other side of the processes making moderate pressure, dragging my hand down to the sacrum, noting any tenderness that may be revealed. I then make pressure with my thumb on each nerve root on either side, again noting the effect. By this procedure you will be able to outline deep contractures and painful areas. Pressure is also made over the body of the muscles, noting care-

fully whether they are contracted—all painful points being carefully noted.

I usually begin treatment for relief of pain with the vibrator, using ball attachment with at first light pressure and short stroke for a few seconds over each painful area, followed by deeper pressure and longer stroke as tolerance is acquired. When muscles are contracted I aim to thoroughly relax them.

The patient is then placed on the static platform and a few long indirect sparks are given. In nervous patients when I suspect that sparks will not be well borne, I use instead the Morton wave-current with a long metal electrode applied to the back. Friction sparks also give much relief. In some cases I have used intense heat either in the form of super-heated dry air or the high-power incandescent light with satisfactory results. Heat is especially satisfactory in chronic cases. So much for the relief of local conditions. But this does not affect a permanent cure in all cases, which should be the ultimate aim of all treatment.

First of all we should look after elimination through the three principal channels, bowels, kidneys, and skin. First of all the bowels should be regulated by correcting errors of diet, the establishment of regular habits, and by proper medication as indicated in each individual case, by local massage and the proper selection and application of suitable electric modalities.

Colonic flushing two or three times a week is a most valuable procedure; the patient may be readily taught to carry out this measure at home.

Elimination through the kidneys and skin may be greatly promoted by the application of super-heated dry air in the body oven at 250° by the electric light cabinet bath or by the vapor electric bath, by the static wave current or static insulation; also by the liberal and judicious use of water inside and out.

Of course it will not be necessary to resort to all the methods outlined in each and every case, but each individual is to a certain extent a law unto himself, and what does best in one case may fail or not be well borne in another.

I will not take up your time by reporting a long list of cases, but will refer to a few merely as examples.

Cases.—Case 1. Mr. W., aged fifty-five, stair-builder, has been subject to attacks of lumbago, being confined to the house for many days with each attack, was exposed to severe cold

during a blizzard in February, 1902, which brought on an attack. When I saw him he was scarcely able to move, suffering intensely. The lumbar muscles were contracted and painful on pressure.

I had small hot air apparatus taken to his house and gave treatment for about forty-five minutes at 300°, giving almost complete relief. He had comfortable night. Gave one more treatment on following day, the patient remaining indoors for two or three days, when he returned to work. The patient has not had a severe attack since, and when there is the slightest warning he comes to the office for one or two treatments and has thus been able to keep well.

Case 2. Mr. J. H., engineer in ice plant, was obliged while making some repairs to machinery to lie on his back on the damp ground for several hours, the next day he was unable to get out of bed or turn over. When called I found him lying on his side with legs drawn up and unable to move. On examination I found lumbar muscles contracted and very painful to pressure. He was unable to come to my office, and as I had no means at hand to apply any of the above methods for relief, I decided to try manual manipulation which I did for about one-half hour, kneading and stretching the muscles. This relieved him to such an extent that he was able to turn in bed and lie straight. On the following day I used a hot sad-iron over a piece of flannel, going over the back thoroughly, using the iron as hot as could be borne with considerable pressure. Relief of pain was almost complete. The third day no treatment was given, and on the fourth day he came to my office and I gave him a treatment with the vibrator and static sparks, repeating the same on the next day at which time there was no pain, and the patient returned to work.

Case 3. Mr. G. S., thirty-five years old, interior decorator, came to office in July, 1905, complaining of pain in back. He said that he has been suffering for a year and a half, had been treated by his family physician at frequent intervals without relief. Pain had become so severe that he was unable to work and when lying on his back was unable to get up without help; examination revealed very tender area in seventh and eighth dorsal regions on right side, even slight pressure causing great pain. I used the vibrator with ball attachment, short stroke and light pressure, gradually increasing both with tolerance

until marked relief was noted. I then placed the patient on static platform, standing with the body bent slightly forward and gave indirect sparks for a few minutes. When he stepped from the platform, he was unable to demonstrate any pain, slept soundly all night, and awoke free from pain. I told him to call again for treatment on the second day, at which time he was still free from pain. I gave him in all four treatments. I saw this patient a few weeks ago and he told me there had been no return of the trouble.

The next and last case that I will report was one of great severity. Mrs. H., aged fifty-two years, was brought to my office from Trevoise, Pa., on February 23, 1906, with the following history. During the mild weather of February she raked up and burned a lot of rubbish on her lawn and in so doing set fire to the dry grass. The fire began to spread rapidly and she feared it would set fire to the cottages in Sel-ing's Grove, a camp meeting ground adjoining her home. In order to avert this danger she started in with a broom to bat out the fire, working under great mental and physical strain for about one hour.

On the following morning she was unable to get out of bed. The pain in her back was constant and so severe that she was unable to find comfort in any position. A local physician was called in, who treated the case for one week without relief. When she was brought to my office she was suffering intensely, looked haggard and worn from pain and loss of sleep. I stripped patient to waist and laid her prone upon the table. The muscles of the back, especially the recti, were in a state of intense contraction and exceedingly painful on slight pressure. In fact there was scarcely a spot from her neck to the end of the spine that was not markedly sensitive.

Treatment was begun with the vibrator, ball attachment, short stroke, and very light pressure over contracted muscles. At first this caused great pain which gradually subsided. Following this I placed her on the platform in a standing position with body bent well forward and gave positive indirect static sparks to back, and told her to return for treatment next day. February 24, was free from pain for several hours after last treatment, slept some during night; gave vibration and sparks as above, treatment was repeated on February 25, 26, and 27, after which she was almost entirely free from pain. I gave her

a treatment on March 6 and 10, after which the patient returned home and has remained well since.

These are a few cases taken from my case book and are not different in a general way from any others treated similarly and satisfactorily.

The methods outlined have been in my hands most satisfactory both to my patients and myself, and I am sure that others employing the same methods will be equally pleased.

5530 Germantown Avenue.

Discussion.

Dr. Henry W. Frauenthal, New York City: Dr. Brockbank speaks of lumbago occurring suddenly when the patient is at work or in bed—personally, I think these are not cases of lumbago, but rather dislocation in the sacro-iliac articulation and resemble the nature of a sprain in the other joints. Dr. Southwaite at the Mass. Gen. Hospital during the meeting of the American Medical Association showed a number of such cases that he had locked up in a plaster jacket or brace. I have relieved the pain and stimulated the absorption of the effusion by high-frequency currents. In true lumbago I have obtained quick relief of the pain and absorption of the fibrosites with the galvanic and high-frequency currents. In one case of Dr. D. W., the patient had suffered intensely for about two weeks, being unable to sleep with even large doses of morphine. Four treatments with high-frequency currents in four days gave absolute relief.

Dr. Herbert F. Pitcher, Haverhill, Mass.: To know just how a disease feels one must have it himself. I have had this trouble, which commenced as rheumatism of the lumbar muscles and inflammation of the fibrous tissue of the quadratus lumborum. As in many cases, it extended to the sacro-iliac articulations and even down the sheath of the sciatic nerve. I had an attack some time ago, and of course thought it lumbago. I had my back treated with sparks and thought I would go through all sorts of modalities. I next tried mechanical vibration and the continuous current, and learned that the condition was not simple lumbago. Many cases which I have treated for some time for lumbago do not even have tenderness on pressure in the lumbar region. When you go down to the sacro-iliac articulations the patients flinch, and with the treatment for lumbago they immediately get worse. As the author has said, in the acute cases we use the eliminants, hot air and high candle power incandescent lamps, but I think the radiant heat with the continuous current is the best treatment to begin with, because in many of these cases there will be found little nodules pressing upon the nerve.

Dr. F. Barrett, Westbrook, Me.: There came under my care this winter a lady from Boston troubled with what I supposed to be spinal neuritis. She had been for a year or two under treatment of various kinds and had taken some electrical treatment in Boston with no benefit. Her history was that two or three times a week she would have paroxysms of intense pain which nothing would relieve but one-half grain of morphia, which sometimes had to be repeated in an hour. I was called during one of these attacks and gave her morphine, and told her to come to my office as soon as she was able for electric treatment, which she did. My method of treatment was to strip the back down to the hips and then placing the ordinary plate used on the static machine on a chair and a cushion over the plate, I connected that with one end of the high-frequency machine, the other end of machine is attached to a large surface vacuum electrode which I run up and down her spine. At each treatment she expressed great relief. After twelve or fourteen treatments there was complete relief. After keeping her under observation for two weeks with no return of her trouble, I sent her home. Two weeks later I received a letter saying that she was well and in better health than she had been for a number of years.

Another case was that of a lady who had suffered for four years with a similar condition. She would be laid up in bed part of the time and the other part hardly able to be about the house. She did not believe much in electricity, but having tried all kinds of medicine and local treatments she decided to try electricity. I treated her in the same way as the first case, but with better results, giving her but six treatments. She failed to return as directed, and meeting her later, I learned that she was perfectly well.

Dr. Geo. D. Bond, Texas: The general modalities mentioned by Dr. Brockbank's paper are good and usually to be commended as the best; but there is a method of treating this condition by the X-ray that came to me accidentally, and one that I still use empirically. Some years ago before I had any experience with electricity or the X-ray, I had a patient, a boy eight years of age, suffering from severe pain in the back and the usual symptoms of lumbago, but usual remedies were without avail. In consultation it was suggested that there might be stone in kidney, and in company with his father I carried him to a neighboring city for an X-ray examination. The X-ray "specialist" knew nothing of the limitations or dangers of the X-ray, as was evidenced by him trying to locate the stone with the fluoroscope. No stone, of course, was found, but we certainly gave him a thorough exposure. There was serious danger of a burn, but fortunately this did not occur. After the exposure, however, he was immediately able to walk without assistance and never suffered afterward. It occurred to me

me at the time that the trouble might have been imaginative and that the effect must have been psychological; but since knowing more of this electrical manifestation, and after using it in quite a number of intractable cases of lumbago, I am convinced that the X-ray has peculiar action on this part of the anatomy. It will relieve some cases much more rapidly than the usual electrical modalities, and even where they fail. This treatment must be empirical like many others are, until we can know more of what effect the X-ray does have on metabolism, but when any certain remedy comes to us, we should use it and work out the explanation as soon as we can, if we can. When we do away with empirics we will deprive humanity of many valuable remedies, and we should refuse no remedy that has proven itself valuable, because we can't explain its action. We will probably understand it as well as we have ever understood the so-called alterative action of mercury, and as we all know, the whole fabric of medicine is built on empiricism.

Dr. William Benham Snow: In exposing a carbuncle to the X-ray for twenty minutes we demonstrate a very marked contraction of the inflammatory tissue. I think in many cases of muscular strain or other inflammatory process the static modalities are employed without a definite notion of the depth of tissue involved and that the modality is accordingly not used with sufficient energy. I had recently a case in which I used the wave current for twenty minutes but with the spark-gap very long, and followed that with sparks, employing a spark director; thereby applying the spark to the place of greatest tenderness—the site of the lesion. By getting right down into the region of the inflammatory process with the sparks, as we can by means of the spark director, the condition is promptly dissipated.

If the conditions in the sacro-iliac region are not due to septic processes, but to a traumatic luxation, we can overcome the contractions in the muscular tissue and relieve the synovitis as in a large joint. There is nothing in my experience in non-infected conditions that will give such relief in deeply-seated affections as the application of the static sparks applied directly to the inflammatory area.

Dr. Sinclair Tousey, New York City: In the treatment of these painful conditions, if the high-frequency currents are used from the ordinary glass electrodes the supposition is that one is going to use a fairly strong current. This is right and very effective, but there is an accident which is possible in such cases. A doctor reported such a case to me only yesterday in his own practice: A patient had had a belladonna plaster on, and he found that the application of high-frequency currents which had been made with the same strength and same duration as he had used in numerous other cases pro-

duced a severe burn. Whether it was due to cataphoresis I do not know, but it seems more likely to me that the skin had been rendered tender by the counter-irritating effect of the plaster and that therefore the burn had occurred; so that, in cases that have been painted with the tincture of iodine or where some irritant plaster has been applied, I think the high-frequency current ought to be used with caution. I had an interesting case apropos of that in my own practice: A man with a typical arthritis of the sacro-iliac aponeurosis. He was very fond of shooting and was considered one of the best shots in the country, but with a weak joint right about the middle of him it has been a very great trial to hold a heavy rifle steady. On examination I found two rectangular scars just as if a red-hot iron had been put upon the skin to brand him. I applied the high-frequency currents in this spot and the results were most gratifying. There was relief of pain with the first application and the condition was cured inside a month.

Dr. J. D. Gibson, Denver: When we get these cases very acute, painful, and with fever, the thing we need there is heat, the super-dry hot air, and I hope the new incandescent lamps will take the place of a good deal of this apparatus. Electricity will not give the result that we get with heat. Some cases of lame backs of long standing we are able to relieve with static electricity. There are some that we do not relieve. I remember one case especially which I thought I was going to relieve with the static application, but after a week there was no improvement. I concluded that the trouble was so deep-seated in the muscles of the back that the ordinary applications of electricity did not reach the condition. I tried galvanism, putting the electrodes at the nape of the neck and over the lumbo-sacral region, giving him from 50 to 60 ma. The man had not done any work for years and had been told that he had tuberculosis of the spine, but galvanism relieved him at once. Whether we can get the static sparks in far enough to reach these conditions, I would like to know. These cases of ilio-sacral luxations,—and I believe we have the same luxations in the spinal column farther up—have been Jonahs to me.

Dr. Brockbank (closes): In regard to Dr. Frauenthal's remarks, I would say that the subject of my paper does not limit me to lumbago, and therefore my insistence upon a careful observation of the back and the most particular examination of the spinous processes posteriorly concerning their proper alignment, etc. I feel certain that many of the painful conditions we find in the back are due to these partial luxations, and it seems a shame to me that we have to acknowledge that we have been stirred up to the point of hunting these things up by our friends, the osteopaths. I am often asked by patients and physicians, what I think of osteopathy. Gentlemen, I think well of it, if it is properly applied by the right people.

In all these conditions there is a source of irritation, and we all know that the first effect on a part when subjected to irritation is to increase its physiological function. If as a result of this the muscles on one side have become contracted and the corresponding muscles have not partaken of this increased activity there will be a luxation as the result of muscular action, not as the osteopaths would say, the disease is due to the luxation.

It makes no difference what the osteopath thinks of us or we think of the osteopath; we meet conditions just as they are in every-day practice, and if we are not going to use a modality that will do good, we are not the men to practice progressive medicine. It makes no difference to me from what source a good thing comes, I try to store it away in my memory and use it when I have a chance. I have had cases where a luxation was definitely marked, not only in the spinal column but in the heads of the ribs—so much so that under treatment you could feel and hear the head of the rib slip back into position. Until we relieve such a position we will not cure the patient. If the head of the rib is partly dislocated there is pain and no matter how much you do, if you do not do the thing which will relieve the muscle tension and relieve that sub-luxed bone, you will not have good results. The same condition is often found in the sacro-iliac joint which often causes pain along the sciatic nerve. I have in mind a case of sciatic neuritis; a dentist had suffered for years and was often incapacitated for work. He came to me with the limb flexed and using it as little as possible. Upon examination I found decided tenderness over the notch and all the way down the trunk of the nerve. He obtained relief from the two modalities, vibration and the static spark. Some patients you cannot prevail upon to take the spark sufficiently heavy to do them any good. This patient had been taking for weeks 12 grains of codein in twenty-four hours. I had him under treatment for five or six weeks, and so far as I know there has been no return of the trouble.

I believe the time is coming when no man can be a successful practitioner and be only an electro-therapeutist. I believe that a man is obliged, if conscientious, to do that which is best for his patient, regardless of what the method is or where it comes from. I have not a series of cases to-day of which I could say any one particular modality cured them. While I practice electro-therapy, every day I am using physical measures for the relief of diseased conditions. There are a number of such measures, any one of which will give good results.

RADIANT HIGH-FREQUENCY ELECTRIC LIGHT BATH CABINET.

BY H. H. ROBERTS, M. D., LEXINGTON, KY.

The constant increase in the use of chemical light for therapeutic measures has led me to devise a cabinet for the use of chemical light in conjunction with the high-frequency currents; especial attention being given to the therapeutic effect of the



blue, violet, and indigo rays. In the treatment of several hundred patients I have found this cabinet to give the most gratifying results, especially in the treatment of all forms of rheumatism, neurasthenia, nervous disorders of all kinds, espe-

cially those of gastric origin, and to increase metabolism and to assist catabolism.

A description of my cabinet is as follows:

It is so constructed and arranged as to consist of polygonal sides of either a hexagonal or octagonal form. At each angle of the polygonal on the inside is arranged a vertical row of specially constructed lamps consisting of a special filament, special glass, focused and having not less than fifty candle power each. The polygonal cabinet is also provided in the angles with a special composition metal of a highly reflecting power and one which will not absorb the rays. These special lamps carrying a high voltage give off a rich flow of the blue, violet, and indigo rays. The lamps are also arranged in such a manner that the focus is concentrated fully upon the patient, who sits nude in the center of the cabinet. The stool of the cabinet is insulated and provided with a heavy condenser for the high-frequency current. The patient is similarly connected with a coil foot plate and in this manner is connected with both terminals of the high-frequency coil. I find that the best high-frequency current is obtained from the static machine. The induction coil being harsher and not having the penetrating power of that produced by the static machine.

The novel construction and the utility of the radiant effect from the lamps in connection with the high-frequency current gives the advantage of the two therapeutic effects at the same sitting. The lamps are also arranged so that the bulbs of different colors follow each other in a constantly repeated sequence to distribute each color throughout the cabinet, a separate circuit for the lamps of the same color and a switch for each circuit; also connected with each circuit is a specially constructed dimmer, with which the intensity of the lamps are under perfect control at all times. I have found the use of this apparatus of special benefit and curative powers in the disorders as enumerated above.



Editorial.

THE OPSONIC INDEX, OR THE INDEX OF RESISTANCE.

THE opsonic theory of Wright presupposes that an injection of toxins "prepares the germs to be eaten by the phagocytes." This might be either due to the lessening of the activity of the germs causing the trouble, or the induction to greater activity of the leucocytes. The characteristic policy, however, of the phagocytes, whereby they actively attack a small infection but hold back from an array of numbers, would indicate either the employment of means which lower the vitality of the infectious germs or increase the numbers and activity of the leucocytes which will attack them. As the employment of a toxin is followed by a lowered resistance, and the reactionary tendency is towards raising of the index, but which failing, no beneficial results could arise; it would seem that the injection of these toxins must either prove a serious matter, or benefit according to the relative reactionary degree of resistance of the individual.

Experimenting along this line which is certain to follow upon the introduction of a theory so plausible, and borne out by a limited number of experiments, is fraught to a degree with danger to the subjects upon which it is employed. Observers should not, however, in the interest of the patient fail to take advantage of various other methods which have a distinct tendency to increase the general index of resistance before instituting the experiment. It is a well-attested fact that the administrations of superheated dry air or light baths increase the activity of the phagocytes, and at the same time inhibit the activity of most germs, particularly of the pyogenic bacteria, which results generally in a successful termination. This fact would substantiate neither view as to whether lowering of the vitality of the infectious elements or increasing the activity of the destroyers was most likely to take place, according to Wright's theory. It is, however, demonstrated that in certain cases at least, the administration of extreme heat or heat and light combined, accomplishes a twofold instead of a single purpose, and we might add a threefold purpose, for by

increasing the activity of the sweat glands the elimination through the skin of toxic materials relieves the system of deleterious influences. The claims of Gibson, that it is probable that the administration of the X-ray leads to the destruction of tubercle bacilli, resulting in a change in the opsonic index, which view is strengthened by the experience of Wilkinson in the treatment of leprosy, and that the toxins produced in the system by the destruction of these bacilli, acting in accordance with the theory of Wright, would seem to be tenable and, in selected cases, might lead to a successful issue.

It would seem, however, that in most infectious conditions, the more rational plan would be to force the elimination of the toxins thus liberated by the administration of incandescent light or dry hot air baths thereby increasing the escape through the sweat glands, than by introduction of toxins into the system. It would in most cases be better to give the physical methods thorough attention and trial in each case before proceeding with the methods in accord with the theory suggested by Wright. In other words to raise tissue resistance, and thereby eliminate toxic materials and germs by means that will effect such result rather than by introduction of another poison which may facilitate their destruction. The other method, we believe, has not yet received sufficient trial to be either universally accepted or set aside. The value and importance of the administrations of heat, light, and the actinic discharges from high potential electrical apparatus have not had sufficient recognition and trial to give them the place they deserve in the therapeutics of infectious conditions.

On the other hand the general consensus of medical opinion based upon the results from vaccination and from the employment of antitoxins in diphtheria and other conditions places organotherapy in the field of broad-minded professional recognition,—an addition to therapeutics.

* * *

THE SIGNIFICANCE OF SPINAL AND GENERAL VIBRATORY EXAMINATION IN DIAGNOSIS.

SPINAL tenderness associated with hysteria and inflammatory conditions of the spinal meninges have been long recognized as being frequent symptoms. The large number of other

physical and functional derangements likewise associated, has been little appreciated by the rank and file of the profession. The common presence of places of spinal tenderness of regions along the spinal column associated with asthma, affections of the head, throat, stomach, liver, intestinal tract and pelvic viscera, are facts upon which the majority of diagnosticians have not learned to place significance. The usual examination by palpation has been confined to percussion and the employment of tactile sensation directed only to the anterior surface of the body, without special reference to the conditions of the back, particularly to the intervertebral spaces between the processes as well as of the abdominal administration of regulated vibratory impulses, whereby areas of subacute inflammation are discovered in the cavity which examination by the hands has often failed to discover.

Those physicians who have employed mechanical vibration for a considerable time for diagnosis, and treatment, have become confident both as to the importance of their investigations in diagnosis, as well as treatment. It is clearly appreciated that the coincident treatment of the referred conditions as well as of the corresponding spinal involvement hastens recovery in most cases, and in some instances, as with the asthmatic, the treatment of the spinal centers seems to be imperative if the cure of the condition is to be effected by any treatment. No one who has become familiar with the relation of these conditions as to the cause and effect will ignore the importance of these observations; and to those who have not given attention to the subject, considerate investigation will prove satisfactory.

* * *

DEPARTMENT OF ORGANOTHERAPY.

THE progress already made in the development of Organotherapy demands its general recognition and appreciation by the profession at large. With this view we feel ourselves called upon to create a new department and have placed it in the hands of Dr. I. Ogden Woodruff, who is in touch and fully in sympathy with advanced medical thought.

OBITUARY.

It is with profound sorrow that we record the death of Professor William James Herdman, M. D., LL. D., Professor of Nervous Diseases and Electro-Therapeutics in the University of Michigan. He died at a private sanitarium in Baltimore shortly following an operation Dec. 14th. He was fifty-eight years of age.

In his premature death science has suffered a severe loss, one that will be most felt by his immediate associates, particularly the Fellows of the American Electro-Therapeutic Association.

* * *

THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

To the Fellows of the American Electro-Therapeutic Association:

At a regular meeting of the Executive Council held in New York, December 1, 1906, the following members were present: Drs. Brinkmann, Heuel, Morse, Snow, and Geyser; by proxy, Drs. Rockwell, Bishop, and Dickson.

In regular order the following business was transacted. The resolutions of Dr. Werber of Washington involving the Association and the business transactions of manufacturers was deemed inadvisable and the council reports unfavorably.

It was regularly moved by Dr. Snow and seconded by Dr. Heuel, "That any legally qualified practitioner of medicine of reputable standing and acceptable to the Executive Council shall be entitled to membership." This motion was unanimously carried.

Dr. Morse, representing the New England Electro-Therapeutic Association, extended an invitation to hold the next annual meeting of the A. E. T. A. in Boston, Mass. A unanimous vote elected Boston as the next place of meeting, September 17, 18, 19.

After disposing of a large amount of minor details the meeting was adjourned subject to the call of the President.

A. C. GEYSER, *Secretary*.

Progress in Physical Therapeutics.

CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL.

EDITED BY WALTER H. WHITE, M. D.

The High-Frequency Spark in the Treatment of Premature Alopecia. By Geo. M. McKee, M. D., New York Medical Journal, July 28, 1906.

The writer calls attention to the confusion in the classification of alopecia, but recognizes three types—the congenital, senile, and premature, only considering the latter in his article. He divides premature alopecia with reference to its origin, into idiopathic, neurotic, and seborrheic, but finally considers but two forms of premature alopecia in his paper. (1) Loss of hair by systemic and neurotic disturbances. Under this heading he includes all cases of alopecia in which there is no evidence of the desquamative. It also includes all grades of alopecia areata. (2) Loss of hair primarily due to bacterial invasion. This includes all the cases presenting evidence of local disease, with the exception of tinea, favus, etc. In short the conditions usually known are recognized as pityriasis, seborrhea sicca, and seborrhea oleosa.

The treatment presents three indications: (1) The use of parasiticides, (2) the internal remedies and hygienic measures, (3) the improvement of local circulation. The writer considers the various measures that have been employed in the past, and then treats of the employment of the high-frequency current. The fact that the resonator spark produces a hyperemia which persists, suggested the idea that it might be applied to the scalp in cases of persistent alopecia with gratifying results. He considers the sparks beneficial both as a stimulant and bactericide. Their prime action in the treatment of alopecia rests in their power of inducing the physiological hyperemia which lasts for several hours, during which period it is marked from six to twelve hours. The hair follicles receive an increased blood supply and also an increased resistance to germ invasion. He considers the fact that hyperemia ceases after a few hours to be very important, as otherwise it might become a chronic congestion. The method of employment is the unipolar discharge from a high-frequency resonator in connection with the static machine, or a Ruhmkorff coil. He says in cases where a hyperemia is produced it may be produced by a mild treatment. He prefers to employ the resona-

tor in connection with the static machine, as it is less disagreeable. The electrode should be attached to one of the terminals of the secondary coil, the current strength to be regulated by the length of the spark-gap with an 8- or 10-plate static machine running at full capacity. It is usually possible to employ a spark-gap of one inch. If the gap is too long, the effluve from the electrode tends to condense into a heavy spark which is unpleasant to the patient.

When hyperemia is not readily produced by this method, it is desirable to attach the transformer to the coil, reducing the spark-gap about 1-4 to 3-4 of an inch. Any interrupter may be used with from 2 to 7 amperes passing into the primary. Although the effluve is much less when used with the coil, the sparks are very much stronger than the static and the reaction obtained in about one-half the time. The writer emphasizes the fact that the important object of the treatment is the production of hyperemia without which very little is accomplished. To obtain best results, the cases should be treated two or three times each week. While applying the sparks the electrode should be kept in contact with the hair, and in motion so as to avoid the heat effects, which are strong enough to burn the hair if allowed to remain stationary for several seconds. The choice of electrodes is a matter of small importance, vacuum tubes of any type serving the purpose. The writer reports results in the treatment of nine cases.

Case 1. Female, under treatment for four months; hair was very thin on the top of her head, on the right side of median line almost denuded, probably due to overwork and worry. Within a month the hair had ceased to fall out. Treated three times weekly. Within two months a heavy growth of down was in evidence. Though the patient was irregular in attendance, she now has a new growth of hair which appears perfectly healthy. In cases of alopecia due to seborrhea the results of this treatment depend both upon the severity and duration of the disease. Good results, however, are always obtained if the treatment is continued long enough. In this the writer has become confident.

Case 2. Female, twenty years of age, suffering from seborrhea, hair falling and very thin. For ten months has had unsuccessful treatment by other methods. Sparkings were begun and administered twice a week. At the end of two months a heavy growth of hair had begun to grow. Treatment was continued irregularly for eight months, the hair became very thick and steadily growing in length. The oily condition was much less marked and the hair fell out very little.

Case 3. Female, aged thirty-three, alopecia due to seborrhea. Hair very thin and short. Solutions of sulphuric sodium, resorcin, etc., greatly improved the oily condition, and

lessened the loss of hair, but there seemed to be no tendency for the hair to grow. The high-frequency sparks proved efficacious in three months.

Case 4. Male, aged twenty-five, suffered from alopecia and seborrhea sicca. Alopecia had progressed for about two years until the hair at the top of the head was extremely thin. Sparkings were applied to this patient twice weekly for three months, and the hair ceased to grow and a new growth was in evidence. The treatments were then reduced to once weekly, and a mild antiseptic and stimulating solution advised for daily use. At the end of seven months the patient had entirely recovered his hair.

Case 5. Male, aged twenty-three, hair very thin on top of the head. Patient made no improvement for 5 1-2 months, then the hair finally ceased to fall and is now growing abundantly.

The two following cases indicate that there is encouragement for apparently hopeless cases.

Case 6. Male, aged thirty-eight. The patient had been gradually losing hair until the vertex and temporal regions were practically denuded. High-frequency treatment was applied twice weekly for nine months, resulting in a good growth of the hair.

Case 7. Male, aged forty years. Hair very thin over temporal region, and only a light downy growth on the vertex. Patient received high-frequency treatment and stimulating lotions. Within six months not the slightest improvement had taken place. He had no confidence in the treatment and was irregular in the treatment. It was only by discontinuing his hair tonics, and assuring him of ultimate success, that he could be persuaded to continue his treatment. A few weeks later, however, a heavy growth of white down made its appearance and treatments henceforth were taken with great regularity. Now a good growth of hair is in progress. Time, patience, and persistency are required, then gratifying results will follow.

Case 8. Female. Scalp appeared healthy. Hair although thick was very short. Almost every hair was split at the end, and short pieces breaking off constantly. The high-frequency treatments were given for four months, when the hair, though still splitting at the ends, was growing longer.

Case 9. Female, aged twenty-eight. Neurotic and in poor general health. Total alopecia areata. Sparkings were applied to the right side of the head every second day for four months, at which time a good growth of hair was in progress on the side treated, while on the opposite side while the hair showed some tendency of growing, it only amounted to a white down. Sparkings were then applied to the entire scalp. At the end of seven months the hair on the side treated was about 2 inches

in length, while on the opposite side it was about 2-3 of an inch in length.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

Electric Baths in Heart Disease. By G. Zimmermann, Münchener medicinische Wochenschrift.

The capability of the heart to respond to stimuli is the criterion as to the possible efficacy of the hydro-electric procedures. There must be a reserve force to call on, and this is the main point, not how much the organ is hypertrophied. As general indications for the alternating current baths, he accepts disturbance on the circulation with low blood pressure, signs of incipient failure of compensation, moderate fatty infiltration with general corpulence, and atonic conditions of the heart muscle and arteries. In advanced cases of sclerosis of the heart and arteries, the indications are more for the Nauheim baths. A combination is excellent in certain cases.

The Treatment of Burns and Skin Grafting. By Haldor Sneve, Journal of the American Medical Association.

H. Sneve advocates the open method in the treatment of burns, that is, the disuse of occlusive dressings and reliance on strict surfaces. The dangers in extensive burns are (1) from shock; (2) from toxemia; (3) from loss of function of absent skin covering, and (4) from exhaustion. For shock, the first indication is to combat the vasomotor paresis, and the only drug at present to be recommended for this is adrenalin, cautiously administered; whisky, morphin, strychnin, etc., are warned against as poisons to the susceptible and already overburdened nervous system. The symptomatic treatment of the resulting conditions is far better. To drive the blood out of the abdomen, he gives drinks and enemas of cold normal saline solution, which add volume to the circulating medium; chafes the hands and feet, and applies local warmth to the extremities and especially to the nape of the neck. To meet the fall in body temperature, he uses the hot bath and maintains a high temperature in the room. Finally, to give the heart more fluid to work on, he uses saline infusion or hypodermoclysis. Toxemia, he believes, is directly favored by occlusive dressings, which retain the discharges and prevent perfect drainage. The dangers of air infection are Sneve considers, negligible, the surface is at first well sterilized by heat, and later, the granulations and crusts protect against invasion. It is to toxemia that he attributes the sudden deaths occurring after severe burns, and the importance of insuring free escape of the secretions is emphasized. The functional activity of the uninjured skin is

also of the greatest importance and for this reason the continuous full bath of Hebra is not the best treatment of burns. Cold spongings and friction are perhaps the best stimulants to skin function, and should be frequently practiced in treating burns. Supplying artificial heat is an important indication, especially during the first few weeks of a severe burn. Exhaustion from constant discharge from burned surfaces is best met by grafting skin as soon as possible in those that have suffered a burn of third degree. He remarks on the slight amount of pain in cases treated by the open method. Another astonishing feature of the open treatments is the favorable character of the cicatrices, which are smooth, flexible, and skin-like.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Effects of the X-ray on Living Tissue. By H. E. Robertson, in the Scientific Review.

Reviews the observations and conclusions of numerous workers with the X-ray during the past few years.

The effects of the ray upon the skin, Carl Beck considers are due to its action in producing an impairment of the nutrition of the cells, especially those of the blood vessels. Newcomet compares the effect with the granular and fatty degeneration of fever. Scholtz believes that the changes in the skin produced by the ray consist in a slow degeneration of all the cells in the various structures composing it. Codman believes the lesion to be trophic, due to the degenerative action of the ray on the trophic nerves. Rollins looks upon it as a process of ionization of the molecular structures of the tissues.

As to its effects upon bacteria and lower forms of life, observers differ. Some state that the rays inhibit or actually kill bacterial cultures; others have concluded that they stimulate bacterial growth, and act adversely only by producing attenuation from overgrowth. Rieder found that an exposure of several hours had no effect upon bacterial growth. The rays are said to stimulate the germination of seeds, though markedly altering their biologic and physiologic properties. Upon amœbæ and other lower forms of animal life they show an inhibitory and devitalizing effect.

In reviewing the work done to determine the effect of the ray upon diseased tissues, he finds: that as upon normal tissue the effect is one of degeneration; that experimentally, in the decomposition of proteids by the ray, the lecithin is broken up; that those tissues which are developing or actively growing contain much lecithin, which, he believes, plays an im-

portant part in cellular development. He therefore concludes that diseased tissue and, in fact, all protoplasmic activity is inhibited, or destroyed by the X-ray; and suggests that this action may be due to the breaking up of the lecithin of the cells, thus removing a constituent necessary to metabolism.

I. O. W.

MECHANICAL VIBRATION-THERAPY.

EDITED BY FREDERICK H. MORSE, M. D.

The Treatment and Cure for Chronic Constipation. By Herbert F. Pitcher, M. D., *Journal of Therapeutics and Dietetics*, October, 1906.

The writer considers all the causes from which constipation arises, in the course of which he says, "an action of the bowels should take place at least once in twenty-four hours. When that function is lacking, there is something wrong. It may be in regimen or faulty hygiene." Much of this sort of negligence he attributes to the rush, hurry, and worry, not only of business men, but clerks, typewriters, and employees of all sorts, who hurry to business and with their meals, not taking the requisite time to eat, or eating in a proper manner, particularly with reference to mastication.

"We are a nation of drug-takers," says the writer. "Your druggist, grocer, and department store man will tell you that at least seventy-five per cent. of the drugs sold to the laity are cathartics"; consequently patients with habitual constipation have been taking drugs for cathartic effects for years without thought of a cure. The writer says that we should see that young mothers carry out our instructions in regard to the proper diet which will correct any tendency to constipation, and should also insist that the child sit on the toilet at least twice a day, for prevention is better than cure. It is agreed by everyone that the function should be a purely physiological one, i. e., free from any artificial agencies except what can be obtained from proper diet, necessary increase of fluid, bodily exercise, and proper hygiene. Many simple and recent cases of habitual constipation can be cured by strict attention to the above means.

When the bowels have reached an enervated atonic state where only the most powerful intestinal excitement will evacuate them something more energetic must be employed, and measures that do not prostrate and make them despondent as drugs do. After a long experience with medicinal measures for the relief and cure of this trouble the writer has found nothing that will compete with mechanical vibratory stimulation, and

consequently does not mention the other modalities in this paper which in many cases are valuable.

The writer's technique is as follows: "With the patient placed upon the table, face down, arms hanging over the edges, muscles relaxed, he applies vibration with a hard rubber vibratode with medium stroke and pressure. As the intestinal tract, with the exception of the rectum, is supplied by the sympathetic nerve, corresponding in the region from the 5th to the 12th dorsal, he applies the vibratory stimulation over this region. The impulse reaches the sympathetic through the posterior primary division of the spinal nerves, and thence by way of the rami communicantes. To stimulate the rectum he applies medium pressure over the nerve centers of the 3rd, 4th, and 5th lumbar, and over the sacrum, thus influencing the spinal nerve supply to that part. The patient is then turned on the back, with feet and legs drawn up in order to relax the abdominal muscles. Then with the brush vibratode, deep pressure is made over the course of the colon, which influences the sympathetic plexuses in the abdomen as well as the nerve supply in the walls of the intestines themselves. The peristaltic movement of the intestine is also increased as well as the gastric glands by light stimulation of the vagi at the sides of the neck. Activity of the liver can be increased by heavy interrupted vibration over that organ. The patient is then turned on the left side with the knees fixed on the abdomen, and with the rectal vibratode well covered with vaseline and using the shortest stroke, the rectum is vibrated for about one minute. Where the sphincter is very tight there is no better method of divulsion, the rapid vibratory motions producing anesthesia in thirty seconds. From one to two minutes should be used in introducing the vibratode. This should be done three or four times for the first few treatments."

Anal fissure, another condition frequently accompanying constipation, can be cured in the same way.

In concluding, the writer states that he has cured cases of twenty-five years' standing when every kind of treatment had been used faithfully, in a patient sixty years of age. Daily treatments for two weeks, when her bowels acted regularly. Intervals were then increased until she took one treatment per week. The patient has gained twenty pounds in weight, her general health is better than for twenty-five years.

He could enumerate many more cases of like character and results. In all the cases drug medication was discontinued entirely, also enemas and suppositories, but the patient was instructed to drink at least four glasses of water daily, besides what was taken at meal time. A selected diet was also prescribed. In all cases the co-operation of the patient must be secured and maintained or else the case may relapse. Strict attention to diet must be given, large quantities of water drank,

and in extreme cases, a certain amount of physical exercise taken night and morning.

PSYCHO-THERAPY.

EDITED BY LESLIE MEACHAM, M. D.

Remarks on the Psychic Effects of Inebriety. By J. Madison Taylor, in *The Monthly Cyclopedia of Practical Medicine*.

The conditions of inebriety which are met by the physician are direct and indirect. The direct are of two kinds, the effects of steady drunkenness, and occasional excessive use. The indirect are of even greater importance and where the disastrous effects are only fully recognized after a cure is effected. The handling of these latter cases is always problematical. Eternal vigilance and long continued persuasive efforts are necessary. Often the individual does not aid, but even resists advice and treatment. The physician is discouraged because he does not see prospects commensurate with the trouble, labor, and annoyance to himself. There are in some of these cases instances of exceptional mental powers. One case cited is that of an extremely brilliant woman, who had become addicted first to cigaretism, then to morphine, and finally to alcohol. Morphine increased her mental and creative power. Alcohol completely destroyed it. Though entirely freed for three months from all drugs, she deliberately resumed the use of morphine, because she was unable to shine intellectually without it.

Another case is that of a lawyer of exceptional qualities who became depressed from the effects of continued use of alcohol, though his general health was unimpaired. He would not admit that this resulted from alcohol and only gave up its use when assured that his liver would be affected. There followed an extraordinary change in mentality. "He found himself eager to undertake new and difficult problems. He acquired almost instantly, a wider range of observation, a broader grasp of practical truths. Old items of information which had become rusted, became efficient in his hands, and from being merely a mediocre lawyer of ornamental and interesting personal qualities, he rapidly developed into a man of affairs and usefulness, taking the utmost pleasure in his progress and its results." The chief difficulty in dealing with such cases, is, first, the fact that they seldom seek relief, because they are conscious of no suffering; and, second, that the medical man does not feel that he has the right to interfere.

Another case cited is that of a distinguished journalist who suffered from recurrent dipsomania, in which after weeks of abstinence he became insane for a week or more and awoke as from a dream, in a deplorable condition and would lose his position. He had dropped to the place of a mere reporter. He

was treated partly by persuasion and partly by full hypnotic suggestion, in which he was directed to go to his physician as soon as he felt a desire for drink. Several times the drink fever seized him and against his will he was obliged to go to the physician at the most inopportune times and places. He has regained his former brilliancy and standing but is still regarded as under treatment.

It is always a revelation to the practical physician, to see how much can be accomplished by omitting the continued effects of the poison upon the cerebral cells for a sufficient length of time.

From a considerable experience in the use of suggestion and hypnotism in alcoholics this rule has become established. After the apparently most difficult cases are satisfactorily relieved, in those which seem easiest, ultimate failure seems inevitable.

(The editor of this department has reached the same conclusion.)

STATIC ELECTRICITY.

EDITED BY J. H. BURCH, M. D.

In a most excellent paper presented before the Orange County Medical Society at Santa Anna, Cal., June 5, 1906, Dr. Alber Soiland, of Los Angeles, reviews in a terse and comprehensive manner the various electrical modalities made use of in medicine and surgery. His manner of presenting the physiological effects and therapeutic employment of the magnetic induced and continuous currents is unique. He thus describes the modalities derived from the static machine. "In discussing the value of the static or frictional electricity, it is first necessary to understand the nature and physiological action of this current. The static, as generated by our modern instruments, is primarily a direct current induced by the rapid revolution of glass discs in a dielectric medium. In other words, by the rapid revolution of the discs, a great disturbance of the normal electric level is produced. This results in a high positive charge on one side of the machine, and a low negative charge on the other. When the resulting strain reaches its limit of endurance a sudden disruption occurs, and we witness the beautiful electric discharge taking place between the conductors. If we now include a milliampere meter in the static circuit, we note that scarcely any deflection takes place. This tells us that no appreciable amperage is developed, and that therefore the formidable-appearing spark must be harmless in so far as producing dissolution or electrolysis of human tissue is concerned."

Dr. Soiland believes that the polar action of the static is

analogous to that of all direct currents. He therefore believes that we should expect contraction of muscular tissue in the positive polar field, resulting in lessened vascularity. This would account for the sedation and drowsiness from the application of the positive crown breeze. On the other hand, the negative polar field, the patient being in this application connected with the negative side of the machine, would include nearly the entire body except the head, would produce a relaxing effect, the blood being distributed to the point of greatest resistance the skin, where its effects are most pronounced, hence, the mild perspiration. If the polarity be reversed, Dr. Soiland affirms, that a twenty- to thirty-minute séance will remove fatigue and cause a feeling of exhilaration from the stimulating effects of the negative polar field on the cerebral tissues. In this manner, he says, that when a mild sedative effect is desired, the positive terminal should be attached to the head, and where a stimulation is sought for, the negative must be substituted. When deep stimulation effects are required, Dr. Soiland advises that pronounced muscular contraction should be induced by means of the wave current and the oscillatory discharge from the ~~static induced~~ ^{static induced} current. For tender and painful areas he advises the employment of the spray and vigorous sparks.

In regard to the selection of a static machine Dr. Soiland recommends on the whole, a Holtz apparatus as the result of his experience with several machines. For drying purposes he counsels the use of either ~~freshly burned~~ ^{freshly burned} quicklime or calcium chloride.

Static Electricity in Therapeutics.

In a paper recently published in the Clinique, Dr. W. B. Webb presents his experience with the various electrical modalities in the treatment of disease.

In regard to the employment of static electricity Dr. Webb is more than enthusiastic. He maintains that there is scarcely any chronic malady that cannot be at least benefited by its careful employment.

Dr. Webb particularly emphasizes the value of the static modalities in the treatment of the aged. In these cases he advises static insulation followed by the positive breeze and a short séance with high-frequency currents, just strong enough to flush the cutaneous blood vessels. The treatment should be repeated daily.

Dr. Webb reports a very interesting case of an old lady seventy-six years of age, who suffered from a cancer of large size just above the clavicle on the left side of the neck. The cancer was removed by a competent surgeon, but the patient did not rally and continued to grow weaker and more and more bloodless. She was troubled with a most tormenting dyspnea.

Remedies did her no good and the prognosis was considered unfavorable. It was suggested that static electricity be tried, hoping that its employment might mitigate her suffering. She was brought to Dr. Webb's office daily for treatment. In a very short time she began to gain in strength and general vitality. The dyspnea ceased troubling her, the digestion improved, and her old-time vivacity returned, and she is alive to-day. [Unfortunately, Dr. Webb does not mention the modality used in this case.—Editor.]

In the treatment of pulmonary tuberculosis Dr. Webb maintains that nothing will accomplish more than static electricity. The patient is to be treated one-half hour daily. Dr. Webb begins the treatment with negative insulation, followed by the static breeze, applying the positive or negative spray according to the condition of the patient; the positive being sedative, the negative stimulating. After the application of the spray, he administers a few mild sparks over the chest and up along the spine. The treatment is finished with the inhalation of ozone generated by connecting the two poles of the static machine to an ozone inhaler. On alternate days the high-frequency current is employed to the extent of reddening and irritating the skin. The ozone generator should be used daily.

In the treatment of painful affections Dr. Webb considers static electricity almost a specific. He mentions a case of pleurodynia that was cured by two treatments. In this case the positive spray was employed followed with sharp positive sparks. In the treatment of neuralgia and neuritis Dr. Webb advises the employment of positive insulation, positive spray, followed by positive sparks. In some cases, however, the patient will improve faster if the brush-discharge is substituted for the spark.

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Trypsin for the Cure of Cancer.

Wm. J. Morton, M. D., in an article in the Medical Record of December 8, 1906, under this heading publishes his results in a series of thirty cases of malignant disease. The trypsin was administered, as advocated by Beard of Edinburgh, on the theory that cancer cells are latent, aberrant germ cells, unmodified in the course of embryonic development; and that they have not been destroyed in the sixth week of embryonic life as they should have been normally according to Beard, by the trypsin of the pancreatic juice.

The procedure followed consisted in the injection of a solution of trypsin (strength not stated) hypodermically, at a dis-

tance from the tumor, the injections usually tri-weekly, and in increasing doses.

The results which impress themselves upon one, and which occur in a considerable proportion of the cases, are:

(1) Changes in the neoplasm; these consist in (a) a marked inflammatory reaction of the neoplastic tissue occurring within twenty-four hours after the injection, and lasting about twenty-four hours; (b) with the continued use of the trypsin a diminution and shrinkage of the growth, in two cases of epithelioma of the face its disappearance, and in several other cases the complete disappearance of individual cancerous nodules (with these changes is a diminution in the severity of the local symptoms). The microscopical examination of one growth (carcinoma of the breast) removed after five months' treatment, showed: a replacement of the tumor by dense fibrous connective tissue sparsely scattered with carcinomatous cells; and a degeneration of those cells still present, with the proliferation of new connective tissue cells about them.

(2) The constitutional reaction of the patient. This was present in a minority of the cases. It is said to be due to the absorption of the products of degeneration of the neoplasm. The symptoms are those of fever of acute onset. High arterial tension is said to occur. The temperature excursions are not mentioned.

(3) The improvement in the general condition of the patient. This is in many cases remarkable, the patients gaining strikingly in weight and strength.

While no conclusions can be drawn regarding the efficacy of trypsin to cure malignant disease, as the apparent cures have been under observation only one and four months respectively, yet in its exhibition we apparently have another means at hand whereby we can mitigate suffering and prolong life in many of these cases.

The Opsonic Theory.

This is the title of the leading article in the Canadian Practitioner and Review for November. It is a reprint of the address delivered at the opening lecture of the Medical Faculty of the University of Toronto by Sir Almroth Edward Wright, M. D., F. R. S.

At the beginning of his article Dr. Wright remarks on the large number of diseases over which drugs have little or no influence, and upon the very few diseases in which they have any specific action. While there are some who believe medicine to be effectual and mankind able to *cure* all kinds of diseases, "As a matter of fact," he says, "man has discovered the way to *tend* diseases. Disease is like a flood along the banks of which the medical man goes so that he may *watch* it, and prevent an excessive amount of damage. In other words there

are some diseases over which he has very little control, and in these cases all he can do is to adopt the expectant treatment, and let nature play her part."

The problems to consider, he states, in connection with bacterial disease, are: (1) Why germs invade the body; (2) what the body does to ward off the germs, or to overcome them, once they have gained an entrance.

Evidently the blood has some influence, for without the body it is an excellent nutrient medium. Bacteria on artificial blood media multiply at the rate of millions in a few hours. Injected into the body no such rapid growth occurs. Therefore there are protective substances in the blood. According to Metchnikoff, the author of the theory of phagocytosis, the leucocytes are the protective agents and the serum an indifferent medium. To test this theory leucocytes were separated from the serum and mixed with an emulsion of bacteria. Kept at body temperature for half an hour no ingestion of bacteria, no phagocytosis occurred. With serum added phagocytosis took place. In other words, the serum prepared the bacteria for ingestion. To the substances in the serum which possess this property he gives the name "opsonins" from the Greek "opsono" meaning "I prepare for dinner." In order to ascertain whether the leucocytes or the opsonins were the important agent in preventing and overcoming infection, he contrasted the action of leucocytes in the blood serum of a patient with their action in a normal blood serum taken as a standard. This standard serum was obtained by mixing the serum of all the normal workers in the laboratory. In the case of a patient with advanced tuberculosis, it was found that his leucocytes, when mixed with normal serum were as active in phagocytosis, i. e., they ingested as many leucocytes, as did leucocytes from a normal person under the same conditions. When mixed with their own blood their phagocytic activity was diminished one-half. Therefore a deficiency in the serum and "if we express the activity of normal serum for phagocytosis as 1.0 we must express the abnormal activity of the patient's serum as 0.5. These figures represent respectively what we term the opsonic index of the normal person and of the diseased."

This resistance of the blood serum varied in the same patient for different bacteria, and a person who had a diminished resistance, or a diminished opsonic index for the tubercle bacillus might have a normal index for the staphylococcus.

To ascertain if a patient's diminished resistance could be raised he performed in individuals with a normal opsonic index, inoculations of cultures of bacteria devitalized at a temperature of 60 degrees Centigrade. He found (v. diagram) that shortly after an inoculation there was a lowering of resistance succeeded by a rise past the original. This high rise was in turn followed by a fall to normal. If again inoculated during this

declining or "negative phase" there will again be a depression followed by a still higher "positive phase" or increased resistance. He found that in diseased conditions he was able to raise the opsonic index and by inoculating at proper intervals, as indicated by the opsonic curve, he was able to keep the individual's resistance to that particular micro-organism considerably above normal. With this treatment he reports cures in a case of tubercular glands of the neck, one of gonorrheal arthritis, several of Malta fever, one of tubercular iritis, and one of malignant endocarditis in which a streptococcus was obtained from the blood in pure culture.

The amount of diminished resistance following directly after inoculation, varies in direct proportion with the size of the dose. Hence care must be taken not to give too large a dose. Also if inoculations are given too frequently, the resistance will not be able to rise sufficiently between inoculations and will be kept constantly low. In other words such treatment can be administered only under the guidance of a record of the patient's resistance known by a determination of his opsonic index taken from day to day. In the words of the author, "We have at present, no short cuts that make it possible to treat bacterial disease by inoculation, without following closely the changes that take place in the blood of the patient as a result of inoculation."

SOCIETY MEETINGS.

SIXTEENTH ANNUAL MEETING OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION, SEPTEMBER 18, 19, 20, 1906.

(Held at the College of Physicians of Philadelphia.)

(Continued from page 646.)

SECOND DAY. WEDNESDAY, SEPTEMBER 19. AFTERNOON SESSION.

The afternoon session, which was held at the Oncologic Hospital, was called to order by the President and opened with a few words of welcome by Hon. John Weaver, Mayor of Philadelphia. He expressed his interest in the work of the Association and the hope that the future might see a new hospital on the site of the present building.

Dr. G. Betton Massey gave a Clinical Demonstration of the Cataphoric Operation for Cancer.

Dr. Fred. De Kraft of New York City read a paper entitled *Methods of Procedure in the Use of High-Frequency Currents*. The paper was discussed by Drs. Edward C. Titus, New York

City; Martin L. Barshinger, York, Pa.; W. Benham Snow, New York City; Charles A. Donaldson, and closed by Dr. De Kraft.

Dr. William S. Newcomet gave a Clinical Demonstration of Radio-therapeutic Results in Cancer.

Dr. G. Oram Ring of Philadelphia read a paper on Electro-chemical Sterilization as Applied to Malignant Disease of the Orbital and Nasal Regions.

Dr. H. R. Swayne of Philadelphia exhibited a patient with Neuroma of the Cutaneous Surfaces of the Arm.

Dr. Samuel McClary 3rd of Philadelphia exhibited several cases showing the result of Cataphoric Treatment of Cancer of the Face.

An informal symposium on X-ray burns was held and taken part in by Drs. Tousey, Geyser, Brockbank, Goodell, and Frauenthal.

A vote of thanks was tendered to the officers of the Oricologic Hospital and to the ladies for the reception tendered to the visiting members of the Association.

Adjourned to 8 P. M. at the Hotel Flanders.

SECOND DAY. WEDNESDAY, SEPTEMBER 19. EVENING SESSION.

The meeting was called to order in Executive Session at the Hotel Flanders at 9 P. M. by the President.

Upon motion the reading of the Minutes was dispensed with.

The Auditing Committee reported as follows:

"We find the Treasurer has (\$102.34) One Hundred and Two Dollars and thirty-four cents on hand as shown by his report, also in the hands of the Secretary \$12.70, making in all in hand (\$115.04) One Hundred and Fifteen Dollars and four cents cash.

"There is due \$95.00 in dues from members of the Association. We find the accounts and books of Secretary and Treasurer neatly and correctly kept and showing zealous efforts on the part of the Secretary in collecting dues.

J. D. GIBSON,

WILLIAM THOMAS BISHOP,

Auditors."

Dr. Bishop announced the recommendation of the Auditing Committee that something be paid the Secretary for his expenses.

Dr. Bishop moved that upon the recommendation of the Executive Council the names of members in arrears for three years or more be dropped from the roll of membership. Seconded and carried.

A telegram inviting the Association to meet in Jamestown in 1907 was read by the Secretary.

Upon motion of Dr. Heuel the telegram was accepted and placed on file.

Report of the Committee on Nominations: President, Dr. Morris Weil Brinkmann, New York; 1st Vice-President, Dr. J. D. Gibson, Denver, Colorado; 2d Vice-Presidents, Dr. A. R. Rainear, Philadelphia; Dr. M. K. Kassabian, Philadelphia; Secretary, Dr. A. C. Geyser, New York City; Treasurer, Dr. Richard Joseph Nunn, Savannah, Ga.; Executive Council, Dr. W. Benham Snow (3 years), Dr. Fred H. Morse (3 years), Dr. Francis B. Bishop (2 years).

Dr. Rainear withdrew from his nomination as 2d Vice-President in favor of Dr. Kassabian.

Upon motion the Secretary was instructed to cast the ballot separately for each of the several officers nominated by the Committee, and they were declared elected.

The report upon the place of meeting contained the suggestion of Jamestown with a provision that the Council have discretion in the matter, as there seemed to be a sentiment in favor of New York City, it being the geographical center of the membership of the Association.

Upon motion of Dr. Heuel, seconded by Dr. W. T. Bishop, a rising vote of thanks was given to the Secretary, Dr. A. C. Geyser, for the efficient manner in which he had conducted the business of the Association.

Dr. Geyser responded that had he had his choice he would have ruled the motion out of order, stating his belief that when a man accepted an office, he simply did his duty when he did the work attached to it, and that no man had a right to accept office unless he intended to perform the duties of such office.

Dr. Heuel moved that a vote of thanks be tendered to the absent Treasurer for his efficient service for a long number of years.

Dr. William T. Bishop moved to include in the motion an expression of regret at the absence of the Treasurer, Dr. Richard Joseph Nunn. Seconded and carried.

Upon motion of Dr. Charles R. Dickson of Toronto the Association stood a few moments in silence in memory of the members who had died during the year.

Upon motion the reading of scientific papers was postponed until the morning session of the following day.

The Executive Session was declared adjourned and a collation was served at the Hotel.

Adjourned to Thursday, September 20, at 9 A. M.

THIRD DAY. THURSDAY, SEPTEMBER 20. MORNING SESSION.

The meeting was called to order in Executive Session by the President at 9.30 A. M.

Upon motion the reading of minutes was dispensed with.

A telegram was read which had been received from Dr. Herdman, and upon motion of Dr. Brinkmann the Secretary was instructed to take the proper steps in regard to the matter.

Dr. Brinkmann moved that the Secretary be instructed to write to Hon. John Weaver, Mayor, a vote of thanks for the kind Address of Welcome and for his words of encouragement and appreciation of the work of the Association. Seconded and carried.

Dr. William T. Bishop of Harrisburg moved that the Secretary be instructed to prepare a letter of thanks to the Oncologic Hospital for their entertainment, embodying an appreciation of their methods of treatment and an indorsement of their efforts to have something done for the institution by the State Legislature.

The motion was seconded by Dr. Frauenthal; Dr. Brinkmann moved as an amendment to the motion of Dr. Bishop, That the Association heartily approves of the methods employed by the Oncologic Hospital as being a decided advance upon the present methods in vogue; and, also express a vote of thanks to the Hospital organization for the kindly manner in which the Association was entertained. The amendment was accepted and carried.

Motion made and carried that a Committee of Three, composed of the President, Secretary, and one other member be appointed to prepare resolutions in the spirit of the discussion expressing the Association's appreciation of the methods employed in the work of the Hospital, and of the cordial treatment received from the Hospital.

The following amendment to the Constitution was offered by Dr. Gustavus Werber:

"It shall be the duty of the Executive Council to keep a record of all complaints of unreliability in business dealings at any time made by Fellows of this Association against instrument makers or other persons catering to the medical profession, and on request, shall furnish to any Fellow the P. O. addresses of all Fellows making such complaints against such person.

"In case the person of whom complaint is made is a member of this Association, the complainant shall have the right to bring the matter to the attention of the Association. Having given six months' notice of the specific charges of the complaint to the Executive Council, the Council shall inform the impeached party of the charges against him and invite a reply to the same, and shall then consider all evidence submitted by both sides and report their findings to the Association at its next regular meeting.

"If the charge of unreliability in the transaction of which complaint was made is sustained the tradesman shall by a two-

thirds vote of the Association be expelled from membership."

Dr. J. D. Gibson objected to a scientific body being turned into a court of justice.

Dr. Brinkmann claimed that the matter should pass into the hands of the Executive Council when it would be referred to the Association and every member be given an opportunity to consider it.

The President announced that action was impossible other than to present the Amendment, since it must go over until the next meeting.

Dr. Frauenthal moved that the next meeting of the Association be held at Atlantic City, just preceding the meeting of the American Medical Association. Dr. J. D. Gibson seconded the motion. A discussion upon the question brought out the necessity of a change of time of the meeting of the Association if the motion carried. Dr. Charles R. Dickson moved as an amendment that the whole matter of time and place of meeting be left to the discretion of the Executive Council. Seconded and carried.

A motion made by Dr. Eaton to adjourn to the boat (an invitation having been received from the Mayor of the City for a boat ride), and to have the reading and discussion of papers on the boat, was lost by a rising vote.

SCIENTIFIC SESSION.

Dr. M. K. Kassabian presented a paper entitled *A Résumé of the Radiometric Dosage of Roentgen Therapy*. The paper was discussed by Drs. A. C. Geyser, New York; Morris W. Brinkmann, New York; C. Am Ende, New York; Henry E. Waite, New York.

Dr. H. Finkelpearl of Pittsburg read a paper on *Experiences with Electric Light in the Treatment of Various Diseases*. The paper was discussed by Drs. Wm. G. Schauffler, New Jersey; F. Barrett, Me.; Thomas W. Brockbank, Philadelphia; Gustavus Werber, Washington, D. C.; Morris W. Brinkmann, New York; Mr. Marshall at request of Dr. Geyser; J. D. Gibson, and closed by Dr. Finkelpearl.

A paper by Dr. Margaret A. Cleaves of New York entitled *The Therapeutic Value of the Visible Spectrum in General Medicine* was read by title.

Dr. F. Barrett of Westbrook, Me., read a paper upon *Concentrated White Light*. The paper was discussed by Drs. Henry W. Frauenthal, New York; Thomas W. Brockbank, Philadelphia; C. Am Ende, New York; W. Benham Snow, New York, and closed by Dr Barrett.

The discussion of X-ray Burns, which had been opened at the Afternoon Session of the previous day, was resumed, and

was participated in by Drs. Henry E. Waite, Henry W. Frauenthal, Morris W. Brinkmann, F. Barrett, Westbrook, Me.; and Dr. M. K. Kassabian, Philadelphia.

Adjourned to Afternoon Session, held at the Medico-Chirurgical Hospital.

THIRD DAY. THURSDAY, SEPTEMBER 20. AFTERNOON SESSION.

The meeting was called to order in the amphitheater of the Medico-Chirurgical Hospital by the President.

Words of welcome were tendered by President Walton, Professor Houston, Mayor Weaver. The President on behalf of the Association expressed the appreciation felt for the kindly greetings and words of encouragement in the work of the organization.

Dr. L. Webster Fox read a paper on High-Frequency Currents in Ophthalmic Practice. The paper was discussed by Drs. F. Barrett, Wm. G. Schauffler, W. Benham Snow, S. Lewis Ziegler, William W. Eaton, G. Oram Ring, J. D. Gibson, and closed by Dr. Fox.

Dr. S. Lewis Ziegler spoke upon Electricity in Ocular Complications. Dr. G. Betton Massey spoke in discussion of Dr. Ziegler's remarks, and Dr. Ziegler spoke in closing.

Upon motion of Dr. Eaton a rising vote of thanks was given to the Medico-Chirurgical authorities for the reception tendered the Association.

Adjourned to Executive Session at Hotel Flanders.

EXECUTIVE SESSION.

The final meeting was called to order in Executive Session at 5 P. M. at the Hotel Flanders, the President, Dr. W. Benham Snow, in the Chair.

A number of applications for membership were on motion referred to the Executive Council with power to act.

Dr. G. Betton Massey presented the following Report of the Committee on the President's Address:

"Your Committee is unanimous in its approval of the splendid résumé of the accomplishments of physiological therapeutic measures of the President's paper and feel that such a résumé can but stimulate thorough work along all the lines of physical therapeutics.

"We highly approve the purpose of the President in urging the high and thorough course in the preparation of practitioners in all branches of physical therapeutics, and we would most earnestly request all post-graduate schools, teaching these methods, to continually raise the standard of efficiency of their teachers and carefully scrutinize the fitness of those who receive

their diplomas or certificates to go out and use these methods upon suffering humanity.

G. BETTON MASSEY,
H. F. PITCHER,
T. S. BARBAR,
Committee."

Upon motion of Dr. Geyser the Report was accepted.

Upon motion the paper of Dr. Charles Am Ende of New York, entitled Fluid Extract of Sheep's Thyroid an Aid in the Treatment of Cancer was read by title.

In the absence of the President-elect, Dr. Morris Weil Brinkmann, it was on motion resolved to authorize the President to install him at the next meeting of the Executive Committee.

After the installation of the Secretary and Vice-Presidents the Sixteenth Annual Meeting of the American Electro-Therapeutic Association was declared adjourned.

BOOK REVIEWS.

MEDICAL ELECTRICITY, A PRACTICAL HANDBOOK FOR STUDENTS AND PRACTITIONERS. By H. LEWIS JONES, M. A., M. D., Fellow of the Royal College of Physicians, London; Medical Officer in Charge of the Electrical Department in St. Bartholomew's Hospital; Late President of the British Electro-Therapeutic Association; Honorary Fellow of the American Electro-Therapeutic Association; Member of the Société d'Electrothérapie et de Radiologie; Editor of "Medical Electrolology and Radiology." Fifth edition with illustrations. Philadelphia, P. Blakiston's Son & Co., 1906. Price \$4.00 net.

The author in this the fifth edition of his work has rearranged his subject-matter with a view to making it more convenient for students. Sections have been added on Current Waves of Medical Coils, on the Use of Mechanical Means for Obtaining Interrupted Currents of Measured Duration; on the Introduction of Drugs by Electrolysis; and on the Treatment of Rodent Ulcer by Zinc Ions, also a chapter on the Treatment of Skin Diseases by Electricity, and a chapter on The X-ray of 60 pages. The work is compiled in the author's characteristically scientific and practical manner, and covers well in most respects the broad field of Medical Electricity. The older currents, the continuous, interrupted, and sinusoidal are thoroughly covered. Like most English writers, however, probably on account of the difficult climatic conditions, he has failed to recognize the importance of the static currents. The physics and therapeutics of the high-potential currents, however, have been fairly well covered. He describes the incandescent and arc light baths, the London Hospital lamp, and the Finsen apparatus as well as the various diagnostic lamps. The work is a

volume of 520 pages, well bound, and should now at this time when electricity must be appreciated and understood, by the profession at large, be in the library of every medical practitioner. The author is to be congratulated upon the general excellence and painstaking care exercised in the preparation of his work. The publishers have produced the work in a substantial and attractive style.

A TEXT-BOOK OF MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY. By GEORGE F. BUTLER, Ph. G., M. D., Associate Professor of Therapeutics in the College of Physicians and Surgeons, Chicago. Fifth Edition, thoroughly revised by SMITH ELY JELLIFFE, M. D., Ph. D., Professor of Pharmacognosy and Instructor in Materia Medica and Therapeutics in Columbia University (College of Physicians and Surgeons), New York. Octavo of 694 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1906. Cloth, \$4.00 net; Half Morocco, \$5.00 net.

For this fifth edition Dr. Butler's text-book has been entirely remodeled, rewritten, and reset, bringing it in accord with the new (1905) Pharmacopeia. All obsolete matter has been eliminated, and special attention has been given to the toxicologic and therapeutic effects of the newer compounds. We notice with much satisfaction that the general arrangement of the book has been so changed that those drugs the predominant action of which is on one system of organs of the body are grouped together, thus suggesting their therapeutic as well as their pharmacologic, alliances. We believe this classification to be more thoroughly practical and useful than any other. By use of a more compact type the work has been reduced in size. It is a pleasure to us to recommend this book to the profession, for it is no doubt most thorough, and in every way one of the best on the subjects it includes.

A NON-SURGICAL TREATISE ON DISEASES OF THE PROSTATE GLAND AND ADNEXA. By GEORGE WHITFIELD OVERALL, A. B., M. D., Chicago, Rowe Publishing Co., 1906. Price \$1.00 net.

In this the third edition of the work, the author states that his methods have been greatly improved and enlarged by daily experience of which this volume is the result. He calls attention to the new apparatus which he has devised for making examination of the urethra, and a new vibratory massage apparatus for the treatment of the prostate, bladder, and urethra. The writer wisely inveighs against the too radical and frequent employment of the knife in the treatment of prostatitis, and quotes numerous authorities to substantiate this opinion. He treats of the various conditions to be found, and describes his own methods which whenever possible he substantiates from the experience of others. He details the results and treatment of thirty-nine cases with results which are generally satisfactory. His observations on the treatment by the high-

potential currents show a deficiency in technique from the fact that he confines himself to the employment of the coil apparatus, failing to recognize the greater value of the vacuum tube employed directly from the static machine, or static wave-current, so valuable in the hands of a large number of observers. The writer's success from his own point of view commends his methods to careful scrutiny and general investigation. The volume contains 24 illustrations and 228 pages.

OSBORNE'S INTRODUCTION TO MATERIA MEDICA AND PHARMACOLOGY. An introduction to the study of Materia Medica and Pharmacology, including the Elements of Medical Pharmacy, Prescription Writing, Medical Latin, Toxicology and Methods of Local Treatment. For the use of Students of Medicine and Pharmacy. By OLIVER T. OSBORNE, A. M., M. D., Professor of Materia Medica, Therapeutics and Clinical Medicine in Yale University, ex-President of the American Therapeutic Association, etc. In one 12mo volume of 167 pages. Cloth, \$1.00 net. Lea Brothers Co., Publishers, Philadelphia and New York, 1906.

This work includes the consideration of Weights and Measures, Prescription Writing, the Preparations, Incompatibilities, Administration and Action of Drugs, and the Important Drugs in Medical Use. It is one of the Medical Epitome Series, which is to consist of twenty-three volumes when complete. The subjects are treated in a clear, concise, and thorough manner and are useful for students especially. To say that Lea Brothers are the publishers speaks for the excellency of the work of the printers and binders.

KIEPE'S MATERIA MEDICA AND THERAPEUTICS. A Manual for Students and Physicians attending post-graduate courses. By EDWARD J. KIEPE, Professor of Materia Medica in the Department of Pharmacy, and Adjunct Professor of Materia Medica and Pharmacology in the Medical Department, University of Buffalo. In one 12mo volume of 265 pages. Cloth, \$1.00 net. Lea Brothers & Co., Publishers, Philadelphia and New York, 1906.

This little work is intended as an introduction to a practical study of Materia Medica in Therapeutics. The laboratory work is introduced by a short consideration of experimental pharmacology. In the second section it includes the action of the various drugs, and is well arranged for ready reference. The most important preparations of the United States Pharmacopeia are included in the section on Pharmacy. Chapter 3 which treats of the Symptoms and Treatment of Poisoning, is remarkably well arranged for both practitioner and student. The chapter on Prescription Writing and Dosage is well worthy of close study. There are also sections on Weights and Measures and Latin abbreviation. The last of the work considers various methods of local treatment of the body and is nicely arranged and well presented. Both the busy practitioner and student will find this book a valuable one to carry around. It is made with the usual finish in binding which characterizes all of Lea Brothers' publications.

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MEASUREMENT OF THE INTENSITY OF THE ROENTGEN RAY—AN ELEMENT OF SAFETY IN RADIOGRAPHY AND OF UNIFORMITY IN THERAPEUTIC RESULTS.*

BY SINCLAIR TOUSEY, A. M., M. D., NEW YORK.

Every time that the X-ray is applied to a human being for purposes of examination or treatment, the operator should have some idea of the amount of radiance to which the patient is exposed. The quality also should be measured, and of course must be adapted to the particular purpose in hand. For instance, quite a different degree of penetration is used in taking the picture of the pneumatic sinuses about the face where the X-ray must penetrate the entire thickness of the head, from a case in which the X-ray is used for the treatment of a disease of the most superficial layer of the skin. Generally speaking, the less penetrating rays are used for treatment of superficial diseases, and the more penetrating ones for the treatment of deep-seated disease, and for purposes of examination either by means of the fluoroscope or radiography. In any case the time during which a patient may be safely exposed at a certain distance from an X-ray tube in operation is entirely dependent upon the intensity of the radiation and the quality of the same. The less penetrating rays, being absorbed to a very great extent in the most superficial layers, are the most active in producing burns. More highly penetrating rays are of less effect in this direction, but cannot be applied without regard to dosage because they too are capable of producing effects upon the tissues of the body—deep-seated as well as superficial. The means of measurement of the quality of the X-ray are of two general classes. The great example of one class is the Walter skiameter, in which a very thick sheet of lead has a number of perforations in it, back of which are pieces of platinum of the

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Philadelphia, September 20, 1906.

following thicknesses: 0.005; 0.01; 0.02; 0.04; 0.08; 0.16; 0.32; 0.64 millimeters. This instrument being held up between the X-ray tube and a fluoroscope, the number of light circles which are visible depends upon the ability of the X-ray to penetrate different thicknesses of the platinum, and the ray is said to be No. 6 Walter when six of these circles are visible. It will be readily seen that in any such instrument the number of circles visible will depend partly upon the intensity of the radiation and partly upon the visual perception of the observer, and not entirely upon the quality of the ray. Every X-ray tube gives out rays which are not homogeneous but a mixture of rays of many different degrees of penetration, so that in any case the soft rays or the less penetrating rays may predominate, but still there may be a sufficient proportion of the more highly penetrating rays to make one or two additional circles visible if a stronger current were turned on, or, if the observer should increase his perception of light by remaining in a dark room for a certain length of time. It has been found that the perception to the light produced in the fluoroscope by the X-ray is multiplied about sixty times by remaining in total darkness for ten minutes or so. This apparatus then is of practical value in determining the quality of the ray, but not for theoretically absolute accuracy. The Benoist radio-chromometer is for the same purpose of testing the penetrating quality of the X-ray, and does so by a comparison between the illumination produced by rays which have to pass through different thicknesses of aluminum and a disk of silver of a constant thickness. In this case, supposing that a sheet of aluminum six millimeters in thickness cast a shadow equal in density to the disk of silver 0.11 millimeter thick, then if the stronger current is turned on they will both cast a fainter shadow, more X-ray passing through both, but still the two shadows will be equal to each other, and the same is true of the two shadows as viewed by an observer after his eyes have become accustomed to the darkness. This is the most nearly absolute measurement of the penetrating quality of the rays which we possess.

Measurement of the resistance of a tube to the passage of a current of electricity through it affords a valuable guide to the penetrating quality of the ray. If it is found that the spintrometer, which is an accessory to the modern X-ray coil, can be approached within an inch or less of the opposite pole of the

coil before a spark will leap across that space instead of the current passing through the tube, then the resistance of the tube must be very low and the ray from it will be of very slight penetration. If, however, the resistance of a tube is so great that we may have sparks flying across the whole 6 or 8 or 12 inches of air space between the two poles of the coil, the resistance of the tube is very high and the degree of penetration is also very great.

The measurement of the quantity of radiance has been accomplished in a variety of ways, depending chiefly upon the chemical change produced in substances exposed to it at the same time that the application is being made to the patient. After certain little tablets invented by Holzknecht, or others invented by Sabouraud and Noiré, have undergone a certain change in color, it is known that a certain amount of X-ray has been applied.

Kienboch's method of measuring the quantity of radiation is by the use of slips of bromide photographic paper in black paper envelopes laid upon the skin near the place to be treated.

Theoretically all these methods enable one to simply continue the exposure to the X-ray until the test object has undergone the standard chemical change as indicated by its color. Practically it is found that a variety of conditions, atmospheric and otherwise, render it difficult to apply these methods every time the X-ray is turned on. At the same time these methods applied under ideal laboratory conditions are excellent for use in standardizing other more practicable methods of dosage.

The practical object to be sought is a means of measuring the intensity of the radiation in terms from which one may in an instant calculate the duration of exposure at a given distance required to produce a certain effect on the tissues if rays of a certain quality are employed. This will enable one to judge at the beginning of an X-ray examination or treatment as to the length of time required or permissible, and the distance from the tube to the patient. Measurements based upon the amount of current passing through the coil, or through the X-ray tube itself, are of value but still do not give positive results. With the X-ray tube in a certain condition, especially as to degree of vacuum, a primary current of 5 amperes may give an intense radiance, while under other conditions a primary current of 15 or 20 amperes may produce little or no X-ray from

the tube. The tube being properly regulated, and all the other conditions being suitably adjusted, the intensity of the radiance is very directly proportional to the number of amperes used in the primary current. This applies, of course, to the same apparatus and less positively to apparatus of different types.

During the last couple of years it has been found practicable to measure the number of milliamperes passing through the tube itself, even at the enormous tension of 60,000 to 100,000, or even a greater number of volts. The milliamperemeter employed is an electro-magnetic one, dependent upon the directional effect of the electric current, and a deviation is produced in one direction or the other according to the direction of the current passing through the X-ray tube. The secondary currents from a coil, however, are in two opposite directions, and it often happens that the inverse discharge or currents in the wrong direction, as far as the useful action of the tube is concerned, are of such magnitude as to vitiate the measurement by the milliamperemeter. Thus, we may have an X-ray tube giving out quite a powerful radiance and making a pretty good picture and producing a therapeutic effect with a proper application, or a destructive effect with a too prolonged application, and still have the milliamperemeter indicate 0, or perhaps even a current in the wrong direction. The employment of means for cutting out the inverse discharge adds to the efficiency of the tube and also tends to make the reading of the milliamperemeter a more accurate measure of the amount of direct discharge passing through the tube. Still, the number of milliamperes is more useful as showing the proper working of the tube for the case in hand than as a direct measure of the time of exposure and the safe distance from the patient. With the inverse discharge cut out, a secondary current of 10 or 12 milliamperes indicates an intensity sufficient for taking rapid pictures through the body or through the entire thickness of the head, and also an intensity of radiance to which the patient should not be exposed for more than a minute or so. This last sentence, however, applies to the cases in which the vacuum of the tube is medium or high, and a perfectly enormous amount of power is required to send this amount of secondary current through the tube. The tube, for instance, may have a resistance of 5 or 6 inches. Under other conditions of a low vacuum in the tube the resistance of a tube may be so small that

a very much smaller amount of power will send a current of 10 or 12 milliamperes through it, and this will not result in a radiance of anything like the intensity of the first, and such a radiance would be absolutely worthless for a picture through any considerable thickness of tissue, and while it would produce all its effect upon the surface of the body, it still would necessitate a much longer application than 10 or 12 milliamperes with a medium degree of vacuum. The number of milliamperes does not by itself indicate the amount of power sent through the tube or the intensity of the radiance emitted by the tube. The milliamperemeter then is a valuable element in the successful manipulation of an X-ray tube, but does not furnish a direct measurement of the ray.

One of the other properties of the X-ray which have been proposed as a measure of its intensity is the ionization of the air through which it passes. This causes bodies charged with static electricity to rapidly lose their charge when placed in air through which the X-ray is passing. Carefully devised instruments for the measurement of the degree of ionization have been proposed by Milton Franklin and others as a means of measuring the intensity of the X-ray. It is quite certain, however, that the X-ray is not the only manifestation of power from an X-ray tube which will produce this effect of ionizing the air, and it has not yet been proven even that the degree of ionization is always proportional to the intensity of the X-ray itself. It is one of the distinct possibilities, however, that this method of measurement will ultimately prove to be the most satisfactory means of determining the intensity of the X-ray.

The Author's Method.

Measurements based upon the direct observation of the fluorescence excited in an ordinary fluoroscope by the X-ray have always appealed to the present writer as the most practicable means of measuring its intensity. This fluorescence is certainly due practically entirely to the action of the X-ray, and its intensity has been found in many different observations to vary as a certain regular function of the intensity of the radiance. The first device for using this means of measurement consisted in the placing of a certain quantity of radium with a fluorescent screen in front of it, beside the screen of the fluoroscope and comparing the brilliancy of illumination in the

two portions under observation. The author's method, previously alluded to at the meeting of this Society held last year, consisted in finding out to what distance a fluorscope could be carried from the X-ray tube and still the operator be able to see the fluorescence excited in the screen when the X-ray was turned on. This I have had in daily use for over two years now, and I have found it a reliable guide to the application of the X-ray. It has necessitated, however, the calibration of the different X-ray tubes and of the different modifications of the current employed. This has been the case only where it was desired to produce a certain therapeutic effect. A very slight calculation has always sufficed to show whether the intensity of the radiance was such as to produce a good X-ray picture and also the length of time for which it may be safely applied.

With a certain tube which the author uses for therapeutic applications, and which is a Friedlander tube, of the same size and general construction as a Müller No. 13 tube, the following observations have been made.

A parallel spark-gap of 2 1-2 inches, rays No. 4 Benoist, a 12-inch Wappler coil with the greatest self-induction in the primary winding, Caldwell interrupter, with 7 amperes of primary current and 4-5 of a milliampere of secondary current, no spark-gap, a connection made using the anticathode without the accessory anode, and with 8 ohms resistance in the rheostat, gave an intensity of 6 Tousey; that is, the fluorescence was visible in a fluoroscope held at a distance of 6 yards or meters from the X-ray tube. And it was found by comparison with other methods of measurement that a 30-minute application at a distance of 15 centimeters from the anticathode was equal to tint B of the Sabouraud and Noiré scale, or to about 7 Holzkmnecht units. This amount of X-ray of the quality indicated is the largest that can be applied at a single dose, not to be repeated until after the development and subsidence of the reaction which it will excite, or it may be given in divided doses five minutes at a time every two or three days until the total quantity has been applied. The effect of the X-ray, it will be remembered, is cumulative and it is hardly a safe matter to give even small doses right straight along without some definite idea of the total amount which is being applied.

The same tube with a resistance of 3 1-2 inches, No. 8 Benoist rays, 8 amperes in the primary current and 2 to 3 1-2 milliamperes passing through the tube, no resistance in the rheostat, gave an intensity of 11 Tousey; that is, the radiance was visible in a fluoroscope held at a distance of 11 yards from the X-ray tube. And under these conditions 9 1-2 minutes' exposure at a distance of 15 centimeters, produces the same maximum quantity of radiance as in the first case.

I employ for certain cases a special X-ray tube of my own for treating small surfaces on the face or in the mouth, especially Riggs' disease and cancer. This tube is held by the operator's hand and is completely of lead glass, opaque to the X-ray, except for a portion directly in front about 1 1-2 inch in diameter. Limiting tubes of lead glass may be applied restricting the field of application to any given area at any distance. The shortest limiting tube enables the anticathode to be brought within 4 1-2 inches of the surface to be treated. The therapeutic applications with this tube have been made with a 12-inch coil, Wehnelt interrupter, great self-induction in the primary coil, 4 amperes primary current, 1 milliampere secondary current, 2 1-2 inches resistance, 2 1-2 penetration, Benoist, no spark-gap, 8 ohms resistance in the rheostat. These produced an intensity of 6 Tousey and a maximum dose, either massive (at one time) or subdivided into a number of applications in the course of three or four weeks at a distance of 4 1-2 inches from the anticathode, would be 20 minutes.

These and many other observations upon the comparison between the intensity as measured by my distance of visible fluorescence with the chemical effect of the rays upon the test tablets of Sabouraud and Noiré and upon the living patient in examinations or treatments and upon photographic plates, films, and papers form the basis of my system of dosage.

It may be partially summed up in the statement that with a penetration of from 3 to 8 Benoist, and an intensity of 6 Tousey the maximum total irradiation would be 34 minutes at a distance of 6 inches from the anticathode. Given in a single application this will produce the maximum reaction compatible with the integrity of the skin. This would be risky for anyone inexperienced in this particular method. Given in divided doses it will produce a somewhat milder reaction, but still after this total has been reached it would be wise to omit the applica-

tion for two or three weeks to observe the development and subsidence of the reaction.

The relations between duration and application (at a uniform distance) and my intensimetric number are such that the time varies inversely as the square of the intensimetric number. Thus, if the fluorescence is visible in a fluoroscope held at a distance of 6 yards (or meters) this is an intensity of 6 Tousey, and if the total of a series of applications should be 34 minutes at a distance of 6 inches, then with an intensity of 12 Tousey (a strength used in radiography) the maximum time of a single exposure or a series of exposures at the same distance of 6 inches would be one-fourth of 34 or 8 1-2 minutes. Or, if the intensity were only half as great, or 3 Tousey, the maximum total exposure at the same distance of 6 inches would be four times as great, or 136 minutes.

If the distance from the anticathode to the surface of the body is varied we must change either the duration of exposure, or the intensity should be varied to correspond. If the distance and the time are varied while the intensimetric number remains the same, then the time should vary directly as the square of the distance. It is commonly desirable to make a therapeutic application with the anticathode at a distance of nine inches from the surface. The square of 9 is 81, which is 2 1-4 times 36, or the square of 6, the time of application should thus be 2 1-4 times longer at 9 inches than it is at 6 inches, if the tube is working with the same intensity. Thus with an intensity of 6 Tousey the maximum total exposure or series of exposures at a distance of 9 inches would be 80 minutes. And at a distance of only 4 1-2 inches the total maximum exposure with an intensity of 6 Tousey would be 20 minutes.

The Doses Represented Above.

The figures given above are for the extreme limit of a single application. This would cause an intense radiodermatitis, falling just short of ulceration. It is the largest single dose that in our present knowledge of the subject seems ever to be required and will very seldom be resorted to. No other application should be made for a number of weeks. The same maximum dose divided into a number of applications, extending over three or four weeks, produces a very marked dermatitis

though not quite so severe as if it were all applied at once. Treatment should be suspended for a few weeks after this maximum total dose has been applied even in divided doses.

This maximum quantity is equivalent to about 7 Holzknecht units and how much less than this total is to be recommended for a single application or for a series of applications depends upon the nature of the disease and the individual patient.

Measuring the Intensity.

The fluorescent screen is supposed to be of barium platino-cyanide and of good brilliancy. The room is to be the ordinary physician's office with the ordinary amount of daylight. The fluoroscope covers the examiner's eyes for about thirty seconds to allow the eyes to become accustomed to the darkness inside the fluoroscope. A heavy metal object like a bell is held before the fluoroscope. And then standing at different distances from the tube the nurse turns the current on and off until you find the greatest distance at which the fluorescence is visible. This distance expressed in yards, or meters, gives the intensity of the rays emitted by the tube.

The personal equation enters into this measurement. In making the test one man may feel that the fluorescence is visible at a greater distance than another, but I have found in training my assistants that the difference between readings by different individuals is very slight. It should be noted, however, that all my own measurements are based upon the faintest light perceptible, not upon a distinct image visible with the fluoroscope.

I made a brief allusion to this intensimetric method a year ago which has been in use for about two years now, and has proven invaluable in my own private and hospital practice.

Since that time Dr. Geo. C. Johnston, our fellow member, has been working upon a device in which the intensity of the light upon a small fluoroscopic screen fastened near the X-ray tube is measured by the resistance in a selenium cell affected by the light from the screen. A battery or electric light current is necessary and the resistance in the selenium cell is indicated by the readings of a milliamperemeter or a millivoltmeter which may be placed in a position where the operator will not be exposed to the X-ray. This has not yet been perfected, and

may or may not prove a practicable substitute for the direct ocular measurement of the intensity of the fluorescence.

46 W. Forty-sixth Street, New York.

Discussion.

Dr. Charles A. Donaldson: In the fluoroscopic screen there is a constant deterioration from the beginning of its use. Is it not a fact that in using it from month to month the operator gets a different distance and therefore there is a deviation in the accuracy of the method?

Dr. William T. Bishop, Harrisburg: I think the author has brought the subject of his paper down to a greater practical demonstration of affairs than has been the case in any paper read.

Dr. Tousey (closes): The screen does deteriorate, but if it is kept with a sheet of glass over the fluorescent surface it does not deteriorate enough to make any difference in the doses. I think that on a general average I change screens about once in two years and I find that I do not have any difficulty in keeping track of the doses of the X-ray.



ELECTRICITY AS A FACTOR IN THE TREATMENT
OF CERTAIN CHRONIC DISEASES OF THE
STOMACH.*

BY OTTO JUETTNER, M. D., PH. D., CINCINNATI, OHIO.

If there is one fact which the practice of physio-therapeutic methods in the treatment of chronic ailments has established beyond the shadow of a doubt, it is the superlative importance of the alimentary canal, more especially the stomach, in connection with the etiology, and consequently with the successful management of these afflictions. In analyzing the clinical picture presented by the majority of these chronic maladies and reasoning back from effects to causes, the stomach is found to occupy a commanding causative position much more frequently than the text-books would have us believe. This is due to the little attention which is ordinarily given to the study of the ill-defined clinical features of chronic cases by authors and practitioners. The cases are uninteresting because they do not respond to medication of any kind. The result is that the physician gets into a rut of routine and hardly hopes to give these cases more than partial symptomatic relief. In this way the notion was engendered and is perpetuated that chronic diseases are *ipso facto* incurable. More exact physiologic reasoning and more definite therapeutic methods have begun to dispel this belief. The actual causes which are hidden behind the symptomatic picture are being recognized and identified. We have learned in Nature's clinic that the *vis medicatrix naturæ* is ever ready, willing, and able to come to the rescue of the disabled organism and its parts, if it is given the proper chance. The study of the so-called physio-therapeutic methods has taught us that long after drugs and haphazard empirical methods have ceased to be of any avail, the body can be acted upon structurally and, therefore, functionally, the damage done by errors of metabolism can be corrected, and the innate tendency of the living body towards physiologic equilibrium or health given a chance to assert itself. I desire to discuss the stomach as the hidden etiologic "nigger" in the symptomatic clinical "woodpile" and add a few therapeutic sub-

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gestions in connection with the management of many of these cases.

There are two ways in which the stomach may play a mighty but unsuspected rôle in the causation of any number of disorders, i. e., by virtue of its anatomical position and by the share which it has in the metabolic machinery of the body.

The anatomical position of the stomach is of the greatest clinical interest. Superiorly the stomach is in contact with the diaphragm, posteriorly it is separated from the ramifications of the so-called solar plexus by only a comparatively thin mass of interposed tissue. The diaphragm receives some of its nerves from the important trunks that supply the lungs and heart and control the functions of respiration and circulation. We can readily see that pressure of a distended, dilated, or misplaced stomach on the diaphragm is capable of irritating these nerve-fibers in the diaphragm and thus cause reflex disturbances of respiration and circulation. I am not speaking of the purely mechanical effect of pressure by which limitation of the actual breathing space is produced or by which the heart itself, by virtue of contiguity, is irritated. The effects I am referring to are true reflex phenomena. They are produced by the transmission of impulses along certain nerve-paths which represent the *locus minoris resistentiæ*. Thus we may find a disturbance of lung- or heart-function in any given case. No symptomatic evidence points to the stomach. The case in the mind of the medical attendant is classified under the head of an obscure functional derangement of the heart or respiratory organs,—whatever that means. A long siege of symptomatic drug-medication is begun. The patient eventually passes into the hands of some other physician and so on, until he has become a typical chronic who goes from doctor to doctor without receiving more than scant symptomatic relief.

What the brain is to the animal functions of the organism, the solar plexus is to the vegetative machinery of the body. It is the central station of nutrition and as such the fountain-head of physical life. The solar plexus through its subsidiary plexus, ganglia, and nerve-fibers, is connected with every part and structure in the body. We are prepared to understand the intensity and multiplicity of effects which a distended, dilated, or misplaced stomach might produce by pressure on the solar plexus and the innumerable paths of nerve-energy that emanate

from it. Mental disorders of all kinds (melancholia, insomnia, neurasthenia, neurotic conditions of many varieties, even forms of mental derangement) might be produced by the pressure of the stomach posteriorly on the solar plexus. There is no doubt whatever in my mind that hysteria and epilepsy are often but symptoms of impaired nerve-function and due to the cause named.

In the metabolic machinery of the organism the stomach represents a part of vital importance. It is true that we cannot separate it from the rest of the machinery, particularly the small and large intestines. It is a fact, however, that in the preparation of physiologic food-material the position of the stomach is supreme. We have just begun to understand what auto-intoxication as a causative factor in the production of innumerable, ill-defined pathologic states means. We have learned that functional and reflex diseases do not represent pathologic entities, but are invariably the outward expressions or symptomatic manifestations of impaired nerve-action, and are due to the presence of toxins which are manufactured when there is a hitch in the process of physiologic tissue-change. This hitch is only too frequently some derangement of the stomach. The connection may be direct, but unsuspected. Here again we encounter a vast number of chronic cases that remain unimproved and uncured because the medical attendant does not see beyond the symptomatic evidence. It is of no consequence whether the toxins are chemical or bacterial in character, whether they are the products of disintegrated normal secretions or excretions. The term "auto-intoxication" to which Metschnikoff and Bouchard have given a distinct and well-defined identity, covers the immense territory represented by the manifold disorders of nutrition and assimilation. From this point of view we are prepared to classify that most typical disorder of metabolism, namely rheumatism, under the head of a true auto-intoxication. The clinical importance of the stomach thus becomes apparent.

In order to meet the indications of all these manifold conditions in the causation of which the stomach plays a part, it is plain that we must address our efforts to the restoration of the structural and functional integrity of the stomach itself. It would carry me beyond the confines of my subject if I were to speak of all the therapeutic indications which these cases

demand, to wit: massage of the epigastrium, certain hydrotherapeutic manipulations, and above all the dietetic regulations which are proper and necessary. I wish to limit myself to the employment of certain electrical modalities in the management of these cases.

A primary induced current of moderate intensity is useful as a muscular tonic to the relaxed and weakened walls of the stomach. It may be applied by means of sponge-electrodes over the stomach and on the back. Polarity is indifferent. This application may be combined with massage of the stomach, the electrodes being held by one hand of the patient and the unengaged hand of the operator. Eventually a secondary induced current of moderate intensity might be substituted. It has a more distinctly tonic effect on the nerve-supply of the stomach and in this way regulates vasomotor control in the stomach-wall itself. A mild constant current applied by means of the sponge-electrodes or the massage-roller has a good effect in many cases in which induced currents are not well borne. These applications should be given every day or every other day.

If the patient is a good subject and co-operates with the operator in an intelligent manner, the direct application of these modalities to the gastric mucosa can be attempted. I have gathered quite a good deal of experience and wish to encourage more extended clinical experimentation along this line. A soft rubber stomach tube is introduced into the stomach, whereupon the organ is comfortably filled with warm water. A copper wire is fixed in the interior of the tube down to the gastric end of it, which, of course, rests in the aqueous contents of the organ. A large flat electrode carries the other pole and is placed either on the back or on the abdomen. The application should be short and mild. In many bad cases of gastric dilatation these applications are followed by surprisingly good results. The expulsion of gas from the interior of the stomach takes place with much force. In cases of atony of the stomach walls the negative pole of a mild constant current should be used.

The principal objection to the use of these hydro-electric applications is the technical difficulty which their employment involves. It is understood that they are not to be used in cases of cancer, ulcer, or acute inflammatory conditions of the stom-

ach. In cases of typical dilatation which are so frequently encountered, they are of great service. After the application has been made, the stomach is emptied through the tube in the ordinary way.

The static modalities seem of little service in the local treatment of the disorders named, unless we use currents of relatively high frequency, either in the form of the static induced or the static wave current. The application is made in the ordinary accepted fashion directly to the epigastrium. I am somewhat in doubt as to the action of these currents on the stomach proper, although the effects on innervation of the organ and of the surrounding tissues are too plain to be ignored. In cases in which the neurotic symptomatology predominates, the benefits from the treatment are usually well-marked and prompt. Heart-symptoms are relieved, breathing becomes easy and deep, the mental condition of the patient assumes a cheerful aspect. In distinctly hysterical patients a state of buoyancy and even of boisterous happiness supervenes. I attribute these effects to the regenerating action of currents of comparatively high frequency on the nerve-tissue of the solar plexus.

In treating these common and almost invariably unsuspected stomach-disorders, two things must never be lost sight of, to wit: (1) that electricity alone is insufficient even in the local management of the affected organ, and (2) that the general treatment of the patient is of the utmost importance on account of the damage done to the organism and its parts by the presence of toxins and other waste-products of perverted metabolism. In the treatment of these chronic afflictions of the stomach electricity should play the part of an auxiliary agent and be combined with epigastric massage, which is undoubtedly the best and most effective therapeutic agent in the treatment of these chronic conditions. Diet is important, especially with reference to the bulk and weight of the food which a dilated stomach with atony of its muscular coat is supposed to receive and carry. The general condition of the patient requires attention (1) because the symptomatic picture frequently completely hides the actual disturbance from view and (2) the presence of toxins in the system brings about a state of malnutrition which may manifest itself in a thousand different ways and cause a variety of secondary disturbances, especially on the part of the nervous system. If these secondary effects

are of long duration, degenerative changes in certain portions of the nervous system are bound to occur. Thus we have cases of paralysis of different kinds that are due to a retrograde metamorphosis of nerve-tissue which again is the result of a toxemic condition of the system produced by a dilated stomach primarily. It is my firm and well-established belief that degenerative changes in the nervous system are always the result of primary etiologic conditions that are artificial products, inasmuch as they could be removed in their early stages by strict attention to the functions of the organs of nutrition. I cannot believe that Nature ever intended the existence of so-called idiopathic paralyses. I can understand the *raison d'être* of paralysis after traumatic causes, e. g., destruction of a nerve-trunk. I cannot comprehend why nerves should degenerate in the animal body unless that body remains for years and years in a condition of poisoning, due to one or more of the many causes of auto-intoxication. The two most fruitful sources are constipation and gastrectasis. That the inheritance of a syphilitic taint should predispose the degenerative changes in a relatively inferior animal body, it is not difficult to understand. If all cases of constipation and gastrectasis would receive the proper attention during the age of adolescence or full maturity, we would produce a healthier stock of old men and women in the next generation or two. Paralyses and other evidences of decay would become rare. Old age would know nothing of weakness and debility but would be as "a lusty winter, frosty, but kindly." In serving the interests of humanity in this way our clinical work is bound to become more exact because we accustom ourselves to deal with causes rather than effects. We practice preventive medicine, which is after all the crowning effort of modern science.

In the treatment of the manifold secondary effects of gastric afflictions electricity is of great clinical value. The general applications of high-frequency currents (D'Arsonvalization) have a most decidedly salutary effect on metabolism and indirectly on the assimilative power of the stomach. They increase the output through the skin and through the kidneys, as was shown by the researches of Apostoli and Hoorweg. They enhance the fitness of the alimentary canal for the appropriation of nitrogenous foods. I give these applications once daily, for ten or fifteen minutes. As an eliminative agent nothing equals

the incandescent electric light bath given two or even three times a week. Its effect is augmented by the application of indirect static sparks over the dorsal region for the purpose of stimulating the solar plexus ("the abdominal brain"). Sparks over the epigastrium are usually not well borne. As a convenient and very serviceable substitute for the general high-frequency application I sometimes use the negative indirect static effluve over the head of the patient. The massage-roller over the back is frequently of service in overcoming that "tired" feeling which all cases of gastrectasis complain of. In conjunction with all these different therapeutic agents we should not forget the bowel-function of the patient. The best and most effective combination of physio-therapeutic agents is probably irrigation of the colon and vibration over the abdomen.

Painstaking study of these obscure but common ailments of the stomach finds its reward in the magnificent results which follow our efforts in the treatment of these conditions. Three-fourths of all chronic ailments belong under the general head of auto-intoxication and are directly or indirectly connected with the condition of the stomach. My own experience has revealed to me the vastness of this clinical territory and the great possibilities which it offers on behalf of physio-therapeutic medication and for the benefit of many chronic sufferers who are by no means incurably ill.

Discussion.

Dr. Fred H. Morse, Boston: I wish Dr. Juettner was here that I might thank him for his interesting paper. He spoke of the many nervous and reflex symptoms which accompany all these stomach affections and that they will bring about conditions that need special treatment, even though the stomach was to blame in the first place. So many of us try to treat the symptoms first and think of the stomach afterwards. I think the paper is a very valuable one.

Dr. Samuel Spencer Wallian, New York City: From my experience I believe all the currents yet evolved can have little effect upon gastropnoia unless you first rigidly control the diet of the patient. The trouble begins with the wrong diet; constipation is generally the result of improper diet. Other causes are actively contributory, but the character of the diet is usually the foundation of the trouble. My belief is that mechanical vibration has done more to tone up the walls of the stomach after it has become exceedingly flabby than any other mechanical, chemical, or physical agent. If the patient will persist in eating sweets and starches and other fermentable food in excess he will continue to dilate his stomach ten times as fast as you can contract it by any means at command. Therefore, I am glad to hear the subject of massage approved by other speak-

ers, and the best method of utilizing massage is mechanical vibration, with a high-frequency stroke.

Dr. Herbert F. Pitcher, Haverhill, Mass.: I agree with Dr. Wallian that the proper diet should be rigidly enforced. It does no good to pull a man out of water and let him throw himself in again. I believe that mechanical vibration will do as much as any other treatment with concentrated electric light. I have had better results with the light treatment combined with mechanical vibration than any other procedure.

Dr. J. Otis Bryant, Chester, Pa.: I would like to ask the last speaker his technic in the use of the incandescent light?

Dr. Herbert F. Pitcher: I use the concentrated light called the Leucodescent therapeutic lamp. I use it over the spinal region for the first ten minutes, and then over the gastric region.

Dr. A. C. Geyser, New York City: I was sorry that Dr. Wallian stopped so short. I think he is thoroughly capable of enlarging upon the points he brought out. In discussing the diseases of the stomach we get as far as Dr. Wallian proceeded. We say that the diet must be strictly adhered to, and then we stop. He said that if the patient continued eating starches, sugars, and other easily decomposed substances he would be as bad as ever. It is very well to make that exception, but it does not help us. I would like to have him say what are the non-easily fermentable foods.

Dr. Wallian: I believe a faulty diet begins with the primary digestion of food. Most of us swallow our food as a mechanical act without stopping to give it the benefits of the first and very essential process of digestion in the mouth. The food goes into the stomach unprepared, and the stomach is consequently unprepared for it and unable to perfectly digest it. If the food is first thoroughly and sufficiently masticated half the battle of digestion is won. If we send it down to the stomach for its first process of digestion unnatural fermentation is an inevitable result. Starches and sweets are necessary elements of food, but if taken in excess, as most people do take them, they cause serious trouble from their tendency to over-fermentation. It would require a five-dollar volume to elaborate a comprehensive dietary and tell Dr. Geyser what he and his patients should eat. He is asking for the earth when there is only time for a little garden patch of hints.

Dr. F. Barrett, Westbrook, Me.: I think regulation of the diet will not help the indigestion unless the bowels are kept in a normal condition. We know that most of our patients with these conditions are among women and children. The children are busy with their play and the women have so much work to do that claims their attention first that they neglect to attend to the call of Nature. When they can attend, Nature has then ceased to call and they wait until the next day. This is re-

peated from day to day till the constipation becomes chronic. This condition of the bowels should receive as much attention as the diet.

Dr. J. D. Gibson, Denver: I do not believe that the diet has so much to do with these chronic stomach troubles as we sometimes think. It has been said that "Americans dig their graves with their teeth." I don't believe it. I think a great many graves are dug because the people do not use their teeth. I think that as physicians we make a mistake in jumping to the conclusion that our patients are eating too much, but that they eat improperly and fail to masticate their food well. The American people as a class it is true are fast eaters and they usually eat an ordinary amount, but I do not know of any other class who look more healthy and are a better race generally. I don't believe that the vast majority of people, especially the constipated, dyspeptic class, eat enough. I believe the trouble is due to mental habit rather than to disease of the stomach. I have patients come to me emaciated and weak. They tell me they can't eat and almost tell me they are not going to eat. I think sometimes that a good mental impression of the fact that their stomachs were made to digest is helpful. I frequently tell them that it is their duty to put the food into their stomachs and that it is my duty to make it digest. Many stomachs are lazy from habit. What is put into them may be put in too hurriedly and improperly, but not enough is taken.

Dr. John H. Mudgett, Philadelphia: I would like to ask Dr. Gibson whether for a man entirely worn out he would not advise a rest. So, with the stomach worn out, the whole alimentary canal must be cleaned out and then an easily-digested diet must be given; a mixed diet and not too much of any one kind of food. For the fermentation I have had good results with the sulpho-carbolates. You can tone up with electricity until the stomach is able to secrete properly, but we are looking too much to the stomach without paying sufficient attention to the liver.

Dr. William Benham Snow: I can only infer that perhaps Dr. Gibson's remarks apply particularly to his treatment of tubercular cases.

Dr. J. D. Gibson, Denver: In nine cases out of ten of gastric disorders there is no disease at all, but merely functional troubles which with proper diet can be corrected. I do not mean a restricted diet. I think more persons will be cured by forcing a nutritious diet, composed, perhaps of beefsteak and eggs, rather than by being cut off with milk and bran mash. Of course, if there is chronic gastritis, cancerous degeneration, or ulcer, attention to the diet will not accomplish much. There must be electrical or other treatment.

Dr. Herbert F. Pitcher, Haverhill: Although the stomach may not be diseased, it may become overworked. People

think too much of their stomachs. One of the most common phrases is "What am I going to eat?" They seem to think of nothing else, and their stomachs get tired. If the food is well masticated, the intestinal canal cleared out, and a nutritious and unfermentable diet given the stomach will take care of itself.

Dr. A. C. Geyser, New York City: I think when Dr. Gibson said patients do not eat enough he should have modified it by saying that they do not eat enough of the proper kind of food. The trouble is we are in the habit of eating too much concentrated food, and the more of this kind of food you put into the stomach, the more fermentation there will be. We need food that will excite peristalsis as do the plain vegetables. Nothing will ferment more quickly in the stomach and intestinal tract than beefsteak and eggs.

Dr. Henry Finkelpearl, Pittsburg: While I do not wish to underestimate the value of a regulated diet, an important factor is freedom from nervous worry. These people will not get well as long as they are under nervous strain and are overworked. I think a most important factor in the care of nervous dyspeptics is to instruct them to work much less and to keep as free from worry as they can.

Dr. Frederick Strong, Boston: I have made analyses and have found great differences in results under conditions in which patients are working or worrying, and in conditions in which we can obtain absolute rest. There are frequent cases in which there is no organic disease but in which the condition is one of purely nervous dyspepsia. In these there will be lack of pepsin or hydrochloric acid. In these cases I have created temporary strength with the high-frequency current through a condenser electrode over the solar plexus thirty minutes after eating. Often this will take the place of the influence of the secretory and the gastric nerves and cause them to secrete sufficient pepsin to digest the food.

Dr. Donaldson: Too little attention is given to the bowels, and it is with the greatest difficulty that we get a clear statement from the patient concerning the nature of the stools. Formerly patients were given calomel, castor oil, and Epsom salts, and there was no difficulty in having the bowels emptied. I recently had a German fellow come into the hospital who was from the country and I made every effort with blood count and urinalysis to discover the cause of the very peculiar nervous attacks which he had. In questioning him I learned that it was their custom to eat six times during the day at home. I directed the nurse to give him an ounce of salts and one-half grain of calomel for forty-eight hours, and at the end of that time there were the vilest stools passed and the man had almost a continuous dysentery for a week. This is only one of a number of cases illustrating that sufficient attention is not paid to the emptying of the bowels.

THE DOMINANCE OF RHYTHM IN ORGANIC
NATURE AND AS A THERAPEUTIC FACTOR.*

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Rhythm is the underlying law of the universe.

All that we know of creation may be described as an infinite association of immeasurable cycles.

All things that exist are in perpetual motion, and without exception every cosmic motion eventuates in cycles.

The planetary system, which we ambitiously try to identify as *our* system, with its central sun, its space-annihilating family of planets, and their several retinues of satellites, its encircling rings and milky ways, its flaming and only seemingly eccentric comets and myriads of scintillating stars, conforms in every remotest and minutest particular with the universal model. All its individual bodies are spheres, and all spheres are essentially solidified cycles. They all revolve in rhythmic perpetuity, and every revolving body moves in cycles.

The cycle is therefore a microcosm and epitome of all that is.

The Latin name of the year is first cousin to the word *annulus*, a ring. The ecliptic is merely a slightly distorted, and the earth's orbit a somewhat flattened circle. Day and night alternate and complete the diurnal cycle. The ocean tides rhythmically punctuate the periodic if only apparent return of the sun and moon.

The dial on which we measure the lapse of time is a circle, the pointers or indices of which regularly and rhythmically meet and pass and meet again. The minutes and hours are made up of cycles of sixty, which will go on rhythmically repeating themselves to the last syllable of recorded time, forever reeling off yesterdays that are but memories of completed cycles.

To this law there can be no exceptions; hence human life is a rounded cycle. Can this fact be cited as a mathematical proof that it too is by necessity without end? To entertain the argument of the myopic materialists would certainly necessitate the existence of semicycles and dismembered hemispheres,

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which are creative, moral, physical, and psychic impossibilities.

If it be objected that these postulates are transcendental dreams, unwarranted by scientific deduction and the material facts, let it be quite as plausibly urged that all our material facts—so named in sheer ignorance—are equally dreamy, when analyzed to a finality, since they are merely accidental and transitory manifestations of certain intercorpuseular vibrations which can neither be seen nor scientifically explained.

Venturing further definitions, *Life* is essentially an incessant succession of vibratory impulses, and this constitutes rhythmic reiteration.

Health is the harmonic and uninterrupted play of the vivified organ, without jar or undue friction.

Disease is vital friction, or the opening of a discordant stop.

Death is the cessation of vibrant impulse. It closes the lids of the organ.

Fate is the architect of the organ.

The music of the spheres is as real and demonstrable as any problem in mathematics.

The morning stars are not poetic fabrications from the land of myth. They have been singing together without lull or intermission since the primal dawn.

Music is vibrant harmony. Psychically it is love struggling for a language.

Love,—a much neglected and almost unrecognized therapeutic factor,—is music that has found its alphabet.

Hate is the jangling of discordant or interrupted vibrations.

If this underlying principle of rhythm, which so dominates and predominates throughout every process, habit, and manifestation of the natural world could by any means be abrogated the entire curriculum of science would have to be rewritten; the undermined foundations of science herself would have to be reconstructed.

In corroboration, the undulatory theory of matter and force, of the evolution of heat, light, and motion, the established law of the conservation of the physical forces,—all these are based on pulsating waves, alternating oscillations, action and reaction, flow and reflow; and all these processes and results consist of vibratory motion, of rapidly recurring, and therefore rhythmic reiterations.

It is now conceded that every motion and change of condi-

tion, whether mechanical, chemical, or vital, originates, advances, and culminates in vibration.

We receive all our knowledge, whether perceptual or sensational, physical, physiological, or psychic, by means of sensitive media acted upon by vibratory impulses.

Plato held that the history of the race has ever been and ever will be a history of epochal repetitions.

The pendulum is a fragmentary exemplar of all motion, and the pendulum describes the arc of a circle. It measures and remeasures the extent of its arc, pausing at each extremity, before yielding to its inevitable law of limitation, thus exemplifying the balanced law of work and rest, of inspiration and expiration, of systole and diastole, stimulation and inhibition,—these inherent attributes of motion which are universally balanced, reciprocal, and compensatory, and which forever maintain a perfect and indestructible equipoise.

Every sound, in its ultimate analysis, is composed of an infinite and imperceptible succession of silences.

The earth and the oceans pulsate unceasingly and in rhythmic unison. Earth tremors, volcanic belchings, geysers, cyclones, simooms, tornadoes, and tidal waves are by no means meteorologic or seismic accidents. They are indispensable in the periodic attuning of the cosmic diapason.

Nature tolerates no accidents. Everything that happens was preordained from the very aurora of creative dawn. An accident would constitute a miracle, and a miracle would unhinge the universe.

Rhythm is the foundation and *sine qua non* of music, and music is a resultant of motion obeying the law of vibratory repetition. Rhythm and music are the psychic Siamese twins whose intercommunicating bond can never be severed.

All sounds resolve themselves into music when sufficiently attenuated, when heard at a sufficient distance, and when blended with a sufficient number of other sounds. The discordant braying of the disconsolate donkey, the bellowing of the batrachian basso profundo, perched upon his floating lily-pad, in the margin of the lake, and the hoarsest croaking of that evil-omened bird that once drove the iron of despair deep into the shuddering soul of the one American poet who adequately realized and marvelously commanded the magic power

of rhythm,—all these are music to listening and responsive souls.

Vibration may thus be defined as the voice of Nature, without which she would be as dumb as Despair, as silent as the impassive Sphinx, a helpless mass of immaterial matter, with no attributes of either cohesion or persistency.

Physiology and pathology sprout from the same stem. One is functional harmony, the other functional discord or functional friction. Therefore when we essay to change pathologic into physiologic action we are attempting to re-establish lost rhythm in a disturbed or arrhythmic organism.

In prosecuting this combat of art against accident we have heretofore appealed principally to the chemist and pharmacist to provide us the means. In these later days we are slowly, questioningly, but surely learning to invoke the more direct forces of Nature, and to realize that these direct agencies are ultimates, while most of our old weapons were less reliable, and less satisfactory, because, for the most part, they were either transients, tentatives, substitutes, or mere palliatives.

Furthermore, in the final rounding up and sequel of science we will no doubt discover that these various forces, now recognized by so many names, can readily be reduced to a very few, if not quite to unity. Perhaps, in time, we will be content to designate all of them by the one comprehensive term, *creative energy*.

We conceitedly make our multiform but superficial subdivisions, and talk pedantically about photogenic waves, thermodynamics, massotherapy, kinesitherapy, electro-therapy, and a dozen other modalities of energy; but all these are readily reducible to the one central, underlying, and fundamental force that dominates the universe. All the countless and varying manifestations of it are merely incidental details.

The curriculum of the medical schools will be slowly and hesitantly adjusted to the new conditions and later revelations. Already the ponderous tomes on the *materia medica* of the past are beginning to be neglected, and are gathering dust on the shelves of the medical bibliothecarians; and when the alert modern physician, impatient of the limitations, and incredulous as to the strict legitimacy of his old-time armamentarium, is cornered and compelled to prescribe from the old uncertain list, he essays to shirk the responsibility, in a measure, by reverting

to some one of the thousand ready-made pharmaceuticals and proprietary plausibilities. Thus he temporizes, and perhaps gains time for further investigation as to which one of the newer and rhythmically remedial modalities he will finally invoke as a source of radical and permanent help.

A few years ago, for such exhibitions of embryo heresy, reputable practitioners would have been stigmatized as therapeutic nihilists, and disciplined in the societies. To-day we are all accorded *carte blanche* to pursue whatever special lines, means, and remedial agencies appeal to our clearer judgments and awakened consciences.

The most important of the newer fields of investigation has been illogically and inaptly dubbed "mechanotherapy."

In the crudest sense of things the word may be called materially descriptive; but it is entirely too material. It ignores the more subtle but equally important psychic element. It practically eliminates neurons, nerve function, and vital energy. It makes the human organism a mere machine.

The term *rhythmotherapy* is not thus restricted. It is sufficiently comprehensive. It permits psychic latitude, without sacrificing scientific accuracy. It enables us to take into account, under one legitimate heading, all the modalities, modifications, and manifestations of phototherapy, electrotherapy, radiotherapy, and every other form of so-called mechanotherapy. The adoption of this word will simplify terms, contribute another needed item toward technical accuracy, and prevent linguistic confusion.

By infinitely subdividing it we have legislated the old-time atom out of existence. We call these infinite subdivisions electrons or corpuscles. Until quite recently the hydrogen atom was recognized as the unit of elemental individuality, the extreme of material ponderability. Now, our material metaphysicians estimate,—albeit they cannot hope to absolutely demonstrate,—that 800 or 1000 electrons could find accommodation within the spherical envelope of a hydrogen atom, or would be required to balance the scale against the former atomic unit.

These electrons are presumed—perhaps proven—to exist only in incessant motion, their velocity being incomputable by any standard yet devised. That this immeasurable velocity is vibratory and therefore rhythmic, is quite as evident as the as-

sumed fact that the electrons exist. To prove the latter renders proof of the former superfluous. It is the ionization, inter-pulsation, vibration—rhythmic motion—of electrons that materializes in the forms that we designate as force and matter. The kind of force and the variety of matter are determined by the respective rate or velocity of the undulatory, vibratory, rhythmic impulses. At one rate it becomes manifest as red light. At various higher rates it merges into all the infinite shadings of the solar spectrum, eventuating in the ultra violet. Becquerel and Roentgen rays, or into rays whose wave-lengths are so infinitely short that the resultant shadings are invisible and can be only hypothetically estimated. Thus what we call matter is a resultant of electrons in incomputably rapid vibrant motion.

The unit of organic structure is the cell. It originates in vibratory,—rhythmic motion. It is developed and nourished by the two conditions, a proper medium, and the requisite impulse velocity. A certain velocity begets a tree, another a trilobite, still another a theologian. One rate develops a saurian, a higher one a simian, a still higher one a senator. One eventuates in gold, silver, or zinc. Another in methyl blue, mahogany, or mercury. Thus we may dispense with the necessity for a "missing link."

Unquestionably all our exploited electrical currents are strictly rhythmic in character. If it be objected that the continuous current is non-vibratory and therefore non-rhythmic this objection falls before the admitted fact that all currents are excited by chemic-ionic action, and all chemic action takes the form of intermolecular or intercorpuseular vibration. Again, the continuous current evolves both light and heat, neither of which can be evolved except through some form of vibratory energy.

The physicists have quite agreed that ionization is the sole origin and source of all processes, whether physical, physiologic, or chemic; and ionization is unquestionably motion, incessant motion, rapid, recurrent, and therefore rhythmic motion.

In an admirable paper delivered before this Society at its last annual session, the late Professor Herdman said:

"According to this view all our therapeutic agents resolve themselves into attempts to bring about the proper adjustment

of ions endowed with their normal energy for effecting suitable combinations." He further adds, "All departures from normal processes of assimilation, nutrition, and growth, resulting in perverted function and pathologic products, are defects in the proper ionization processes."

All these evolved facts and more than plausible hypotheses clearly suggest, if they do not positively prove, that the countless forms of certainly natural, even when artificially evolved, excited, or more properly diverted energy will ere long be reckoned among our most rational, safe, and efficient—possibly our only—means of restoring defective, debilitated, or dormant functions, and of destroying pathologic products, by simply and naturally re-establishing normal and physiologically perfect ionization within the tissues.

That over-enthusiasts and careless or indiscreet and ignorant experimenters have failed and will continue to fail with x-ray, high-frequency currents, static modalities, and mechanical vibratory manipulations is not to be accepted as competent evidence against the remedial potency of any of these rational measures, when intelligently invoked. The enterprising practitioner will study deeper into the nature and possibilities of these newer modalities of an art which is yet in the swaddling-clothes age of its ultimate growth.

To this growth it is the privilege as well as duty of each one of us to contribute, each in his own, but never over-confident way some helpful hints and individual observations and deductions that may have escaped the ken of more astute, and mayhap more technical and scientific colleagues.

The field of rhythmotherapy, regardless of the special means, methods by which we work, is as wide as the universe, and every by-path and main highway of it is open to us all.

509 Fifth Avenue.

Discussion.

Dr. T. S. Barber, Charleston, W. Va.: I think it is a great privilege to have heard this paper, and what the author said was all right.

Dr. Morris Weil Brinkmann: I am more than pleased to have heard this paper. A great many members of this Association will recall the fact that I have endeavored upon every

possible occasion to introduce a very broad use of things and the alliterative illustration which the doctor has recited is a very good means of indicating his view. I fully agree with him that there is no form of energy which manifests itself which does not do so under the influence of a law of motion. We are taught so by all the physicists and while their conception of the character or individual type of movement may be somewhat at variance, they all agree that movement is at the basis of all the manifestations of force exhibited in nature, whether as to the static current or the continuous current; but we can go further than that; cold and heat, in other words, hydrotherapy and thermotherapy are simply variations in the movement of molecules of matter at different rates, and to a certain extent the application of heat might be interchangeable with some of the mechanical or electrical rates of movement. I do not think any will dispute the fact that if life is essentially motion, alternations of life are necessarily accompanied by variation in the rhythmical norm.

To attain definite accurate knowledge of the different influences in nature I am sure is the dream of every scientific worker.

Dr. Wallian (closes): I do not think there is any occasion for the usual closing and generally either defensive or apologetic remarks in connection with this discussion. Since no one criticised its arguments or its assumptions, I will therefore waste no further time in adding to the matter in my paper. I thank the speakers for their courtesy, and you for this opportunity.



REPORT OF CASES TREATED WITH STATIC ELECTRICITY.

BY ALICE B. CONDUCT, M. D.,

Professor in the Medical School for Indian Women at Punjab, India.

Case 1.—A little Brahmin boy, seven, years of age. His mother gave a history of having had several beautiful children who had died of tuberculosis. This child was without doubt suffering from a tubercular ulcer on his leg.

It had been treated for some time at our out-of-door dispensary, but with indifferent success. The ulcer was a large

three-fold coalescing ulcer made up of separate ulcers, measuring two inches one way, by two and one-fourth the other diameter, with the beginning of a fourth near. The ulcer was spreading rapidly. The boy was so alarmed at the large machine shining in its polished brass and glass and wood-work, that his mother had also to mount the insulating platform holding the boy in her arms. The natives here do not sit on chairs, so I spread a folded sheet on the platform and they sat on that.

The Brahmin mother, draped in her chudder, came daily, and seated on the platform, clasped her boy to her heart, while she resolutely held out the reluctant little leg, to get the brush-discharge.

I treated that ugly ulcer only twelve times. The edges sent out rapidly a film of skin tissue over the great raw surface. I treated it daily for one week, and every other day after, giving a general treatment every other day, with about eight minutes' treatment. The ulcer was daily dressed in anti-septic gauze with a dusting of boracic acid, and iodoform. The grateful mother has, in her Oriental manner, laid her head at my feet, and promised to pray to the gods daily for me.

Case 2 was a young Englishman, who came here on a visit and I met him at a social gathering. He was suffering from a large carbuncle on the neck. The carbuncle had gotten well under way. There was a well-pronounced pus center with two cores. I told the inquiring friends to bring the young fellow to me early next morning. It was necessary to first open the pus cavity, and discharge the two well-formed cores, and then I used the brush-discharge twice daily. After the third treatment there was no more pus, and the deep wound made by my incision healed within seven days. It is well to add that after the third day the induration surrounding the node had so far disappeared that all of the deep bluish color had disappeared.

I heard from my patient at the expiration of two weeks, saying that he was about resuming collars, which of course proved that all the tenderness was gone, and a normal condition present.

Case 3.—A Mohammedan woman had been treated for some time at our out-of-door dispensary. The dorsum of her right foot was one mass of pus-discharging eczema. The ordinary treatment had been applied with indifferent success. I had

the foot cleansed with a boracic lotion, and then sent to me. I sprayed it with the brush-discharge. The patient was so afraid of the imposing machine that she trembled all over; but she bravely sat still until I had finished the treatment. Then she bolted, running down the veranda like a frightened deer. Much to my surprise, she appeared again next morning, for she said it had itched so much less, and felt so much better, that she was sure I could cure her. Although each time she seated herself on the platform for treatment she trembled like a leaf, she courageously persevered in coming. In eight treatments her foot had so far recovered its epithelium that there was only one small spot on the instep left eroded. She no doubt thought that it was so far healed that she could venture not to come again. So I saw no more of her for a week, when she again appeared with that eroded spot somewhat larger. She said it had begun to itch again so badly, and was getting larger, so she begged me to again receive her. She came then four times, when the eroded spot was reduced to a mere pin point, and we have seen no more of her since.

The greatest achievement it seems to me in skin troubles is that the formation of pus is inhibited, and a greater activity of cell formation encouraged.

I have not time now to give in detail my success with enlarged spleens, when employing the Morton wave-current; but suffice it to say that it is certainly phenomenal. I am working from 8.30 A. M. to 1 P. M., and have to turn patients away daily for want of time to treat them.

Will some one who wants a fair trial of static electricity to be made in India not be induced to send me out another static machine, so that I may be able to do all the work that comes to be done within the half day that I have to give to medical work, because I am obliged to leave half the day for lecturing to students. This is the only medical school in India where women can get a full medical training under the special protection that is necessary for the women of India.

Our static machine is the first that has ever done any work here. This part of India is an ideal place for the static machine, for at least eight months of the year. The air is dry in the extreme, and some days the electrical conditions of the atmosphere seem to be such that while the static is at work I am hardly able to handle any of the heavy metal stands that

support the X-ray tubes, or the electrodes, without receiving a distinct discharge of electricity.



UNDER-OXIDATION OF THE BLOOD, AND WHAT IT STANDS FOR.

BY WM. D. NEEL, M. D., CHICAGO.

Under-oxidation of the blood and the resultant subnormal temperature of the body are far more common and are of greater significance than the casual observer is prepared to believe. This conclusion is based upon very extensive observations of the subject of subnormal temperature, its cause, the consequences, and the seeming little attention these conditions have received.

Medical literature has been exceedingly silent upon the subject. The question of the importance and means of oxidizing the blood for the prevention and cure of disease has scarcely passed the primary stage. We all know, empirically, that increasing oxidation of the blood by fresh air treatment is often attended by good results, but how best to oxidize, when to increase oxidation, and how much oxidizing to do are matters that have not even reached the stage of practical art, much less one of science.

Physiologists long ago settled the question of how animal temperature is produced and maintained. The cause of body heat was formerly attributed to fermentation, but later to combustion; the chief agent of which process is oxygen.

. If the blood does not receive sufficient oxygen to cause the proper amount of combustion to take place, it will surely result in a lowering of body temperature. A low temperature is not a normal condition. It is a danger signal. Not necessarily an immediate danger but a danger nevertheless.

As soon as oxidation to a part is diminished, that part begins to die and becomes a suitable field for infection.

When the blood receives sufficient oxygen to unite with carbon in the proportion of two atoms of oxygen to one of carbon, carbon dioxide is formed which is in a suitable condition to be eliminated. When an insufficient amount of oxygen is received by the blood, carbon monoxide is formed which is not readily

eliminated and, through its toxic influences, functional disorders arise.

Carbon monoxide is a deoxidizer, destroys hemoglobin and otherwise lessens the resisting powers of the blood to the destructive influences of micro-organisms and organic diseases are invited.

The union of carbon monoxide with the oxygen-carrying bodies of the blood has such a strong tendency to permanency that its separation is only accomplished after prolonged and persistent efforts at oxidation.

One of our best aids in making a diagnosis generally is the clinical thermometer, but the force of habit is responsible for many oversights in its use. As a rule, when we unsheathe our thermometers for clinical observations, we anticipate fever and feel contented when the register fails to poke its nose above the spear that stands for normal. So strong is this habit and so fully are we imbued with the idea of fever that we have fallen into the custom of calling the clinical thermometer "a fever thermometer." It is a most common occurrence to hear a physician ask for "a fever thermometer" or speak of the clinical thermometer as a fever thermometer.

Why call it a fever thermometer when there is as much significance to be attached to the reading when the register stops below the normal mark as there is when it rises above? I fear that we are too liable to conclude that a low register is the result of haste, imperfect contact, failure to exclude air, or that a subnormal temperature is non-important. Probably we pass a subnormal temperature over lightly because it does not indicate an acute trouble or anything that would tend to a rapid dissolution.

It is to be feared that we have learned too little of the lesson of under-oxidation as a cause of disease, if, indeed, not a most important factor in senile atrophy.

It is natural for one who has studied a subject as long and as closely as I have this one to run to extremes, but I have found so much in it that has been apparently overlooked that it astounds me. I find that many other physicians are equally surprised when they are induced to get out their thermometers and test the temperature of their obstinate and chronic cases. They can hardly believe their own eyes when they almost invariably find a high percentage of them subnormal from the

fractional part of one degree to two, three, four, or five degrees. Especially will this be found true when the temperature is tested early mornings. The subnormal temperature is not only observable mornings but in a very high percentage of cases, it obtains throughout the twenty-four hours of the day.

In seeking an explanation for the great prevalence of subnormal temperature, some have ventured the suggestion that "a low register may be looked upon as a normal condition." This deduction can be controverted by placing those of low temperature under better conditions for oxidizing the blood, when the temperature will be seen to rise to 98.6° F. and maintained indefinitely.

The symptoms that arise from under-oxidation of the blood are not necessarily in proportion to the degree of subnormal temperature. A patient, showing the fractional part of one degree of subnormal temperature, may present as severe symptoms as one who is several degrees below.

The subnormal individual will almost invariably present some one or more of the following symptoms: Fatigue, lack of energy, pain in the back, loss of memory, sleeplessness, headache (creeping, throbbing, or bursting), constipation, loss of appetite, constant sense of pulse-beat, visual disturbance, stomach complications, disordered menstruation, vertigo, lower limbs have a tendency to give way beneath the weight of the body, shooting or darting pains, headaches sent them to oculist, cold hands and feet, frequent micturition nights, numbness or creepy sensations, heavy sediment in urine, cough, tightness of chest, difficulty in breathing, palpitation of the heart, flushing of face or body, apprehensive of dreadful happenings, etc.

From these symptoms, we are warranted in rendering a diagnosis of under-oxidation, taking on the form of either neurasthenia, insomnia, functional insanity, asthma, constipation, consumption, dyspepsia, anemia, liver or kidney disorder, ovarian trouble, womb disease, menstrual irregularities, sexual depression, malnutrition, hysteria, chorea, etc. And, we might find that organic complications have already set in as bacterial and toxic troubles are highly favored.

Interference with functional activity impairs the resisting powers of the whole economy. If the blood is not right, other things will go wrong.

I believe that I am well within the limits of facts when I

assert that under-oxidation of the blood is responsible for the great majority of functional diseases and that organic diseases owe their existence mainly to function perversion.

A sufficiency of oxygen for the blood means better blood, better combustion, better equilibrium of the body temperature, better circulation, better vasomotion, better functional performance of all the organs, better assimilation of food, better elimination of waste products, less chance for auto-intoxication, better chance for body builders, and less chance for body destroyers.

It is a praiseworthy fact that the attention of the medical world is being more and more directed towards better oxidation and less medicine as a means of treating disease. It was a great revolution in medicine when the profession discarded the practice of medicine by depletion for that of oxidizing and building up. It was a great step but we have been dreadfully slow in formulating the new method into a practical and satisfactory system. As a comparison between the two systems of medicine, a brief summary will show a radical difference.

For instance, the practice of medicine by depletion had reached the zenith of its glory in the days of George Washington, and soon after his time it began to wane. Up to the George Washington period, most all acute troubles were classed as fevers. When one was taken sick, he was put to bed, the doors and windows were closed, the cracks were chinked, evidently with the object of excluding every breath of fresh air. All the available bed clothing about the house was piled on the patient with the view of causing him to sweat. If he failed to sweat, hot bran or steaming hot ears of corn were packed about his body, he was denied drinking water, and was either bled, leeches, cupped, or blistered; all with the object of depleting the fluids of the body to overcome disease.

Under the revised system, the order of procedure is completely reversed. Now, the doors and windows are thrown open, if the weather will at all admit, to give the patient fresh air for the purpose of better oxidizing the blood. Light weight covering is used or none at all, to allow the excessive temperature to radiate in the open air. If the temperature is not reduced to a desirable degree in this way, a cool sponge bath is given and if the temperature is too stubborn, a cold plunge may be resorted to and the patient is given all the water he can

drink, and when he becomes convalescent, he is put out of doors for more fresh air than it is practical to get indoors. The great aim is to build up and give the patient resisting powers and not to deplete and tear down.

Oxidizing the blood for the purpose of preventing and curing disease has grown steadily in favor. But slow progress has been made towards the improvement or better application of Nature's remedy. We still use it, indiscriminately, as Nature originally provided it for the most part.

Better ventilation of the patient's apartments or turning the patient out of doors is good in many instances, but it does not assure the necessary amount of oxygen in many cases for obvious reasons. A want of knowledge of how to breathe properly, the too passive activity of the air to satisfactorily meet existing pathological conditions, obstructions of the nose, the lining membranes of the lungs thickened by catarrh and coated with mucus are some of the obstacles to free ventilation of the blood or, in other words, the proper exchange of oxygen for carbon dioxide.



Editorial.

ATTITUDE OF THE PROFESSION TOWARDS THE THERAPEUTICS OF THE ROENTGEN RAY.

WHEN members of the medical profession who have demonstrated the value of the x-ray write in an alopogetic spirit, seeming to fear lest they be termed enthusiasts or incur disfavor from the surgical members of the profession, it is time that such writers be considered in their true light. It is a notable fact that there are several prominent members of the medical profession, who are now earnestly advocating the use of the x-ray, who a few years ago wrote in the same apologetic manner, fearing lest they might be looked upon as standing in a ludicrous aspect before the wise men of the profession.

The time is past, if there ever was such a time, when those who have proved its value need stand back and display timidity lest those who differed because of ignorance or prejudice are induced to ridicule them. Adverse criticism of facts so well established as the therapeutic indication and value of the x-ray are certain to bring not those who employ them, but the critics, and those who ignore them into disrepute; and the physician who writes displaying fear of the possibilities of such criticisms, places himself in a very ridiculous position.

The most ardent advocates of the Roentgen ray do not believe that it has proved an infallible cure of all cases of malignant disease, but few fail to accord it a place approaching a specific in the treatment of most cases of epithelioma, lupus, tubercular glands, acne vulgaris, and a large number of other superficial conditions.

Nor can it be denied that the x-ray plays a most important rôle in conjunction with surgery, or other procedures, associated with the treatment of all malignant processes. The surgeon who fails to recognize the importance of its effect, and does not accord it a place in connection with his operative procedures, is no friend to his patient, or willing to give her every chance of restoration. The time is near at hand when the force of this truth must be recognized by all, and when to ignore any measure that would contribute to further the successful issue, must be looked upon as inexcusable negligence.

ADVANCED THERAPEUTICS.

UNDER the caption "Advanced Therapeutics in a Governor's Message," the Medical Record refers to the fact that Gov. Deneen, of Illinois, devotes a larger portion to the medical matter than is customary in such documents; appealing for a more general use of drugless treatment, referring particularly to the use of hydrotherapy as instituted in the State hospitals of Illinois.

The editorial calls attention to the importance of the institution of this sort of education in the medical schools of the country, but loses sight of the fact that in hydrotherapy we have but one of the *advanced therapeutic* measures, the institution of which should be urged upon the educators in our medical schools.

The importance of the general acceptance and employment of electricity in accordance with the advanced knowledge of its great value in therapeutics should as well be impressed upon the medical boards of control of our great medical colleges, particularly in the East. To the present time but few colleges have recognized the importance of the physical measures: Electricity, light, the x-ray, mechanical vibration, and hydrotherapy. Cornell University, and the Homeopathic colleges in this city, the Medical Chirurgical College of Philadelphia, Tufts College of Boston, and some of the Western and Southern colleges, have equipped themselves to a greater or less extent with the facilities for teaching these subjects, but we feel safe in saying that but in few respects, even in these institutions, have they been accorded the full recognition that their importance warrants.

The growing tendency, however, to the adoption of these measures, will lead up in a few years to their general recognition, and proper introduction into the curricula of all of the medical colleges of the country. The public demand for this sort of treatment is growing so rapidly, and the need of the knowledge so keenly felt by the members of the profession, that this demand, if no other reason, is certain to lead to the general adoption and recognition of drugless methods, particularly the energetic physical agents to the courses of instruction, everywhere.

AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

SECRETARY'S PAGE.

Fellows: Since it has been determined by the Executive Council to hold our next meeting in Boston, September 17, 18, 19, 1907, let us begin early this year and collect material for the presentation of papers.

Make up your mind in what particular channel you are meeting with the best results, carefully note all the data and collect them.

Embody the salient points in a concise, short, snappy paper and in your own words present them at the meeting. What a world of information will be presented at the Boston meeting if this is done.

Now, fellows, let us increase the membership of the Association. The Executive Council after thorough and careful deliberation has decided that the question of school is one that has been the means of limiting the scope of our work. The Council, therefore, following the lead of the American Medical Association, will hereafter admit all legally qualified medical practitioners in good standing, properly vouched for by a fellow in good standing, and acceptable to the Executive Council.

Every fellow can at least forward one application, and the good work will go on, and the Association be the true exponent of all that is good in electro-physico-therapeutics.

The following have been proposed for membership: Dr. Giacinto De Sillo, Rome, Italy, graduate University of Rome, Italy, by Prof. Carlo Colombo; Dr. David A. McMichael, New York, graduate New York Homeopathic College, by Dr. William Benham Snow; Dr. Charles E. Doubleday, Penn Yan, N. Y., graduate Syracuse Medical School, by Dr. Albert C. Geyser, New York.

In the near future this page will contain the names of all the fellows in good standing. See that your name is one of them.

A. C. GEYSER,
Secretary.

Progress in Physical Therapeutics.

CONSTITUTIONAL DISEASES.

EDITED BY FRANCIS B. BISHOP, M. D.

Treatment of Pulmonary Tuberculosis in Children. By James Burnett, M. A., M. D., M. R. C. P. E., Archives of the Roentgen Ray, December, 1906.

The writer lays particular stress upon the importance of prophylaxis. In children pulmonary tuberculosis is often induced by infection of the bronchial and mediastinal glands, during convalescence from the measles and whooping-cough, more particularly when complicated by bronchitis or bronchopneumonia, consequently prophylactic treatment of pulmonary tuberculosis requires due care in the management of the diseases referred to. The cases should be watched and the chest thoroughly examined from time to time. The question of treatment when the disease is present, calls at first entirely for fresh air. A low temperature is not objectionable when there are not sudden or great extremes of change of temperature. The soil of the locality should be dry and the exposure sheltered from east and north winds (referring to the climate of Great Britain). "A relaxing atmosphere should be avoided and a bracing, dry situation be selected. The patient should spend the day entirely out of doors, except in very wet weather, and sleep in a large well-ventilated room by himself. He should amuse himself with hoop-rolling, skipping, avoiding, however, fatiguing exercises such as running, and should be given a cold or tepid bath every morning, followed by a brisk rubbing imparting a warm glow to the skin." The writer puts particular stress upon the fact that a low temperature is most beneficial in the majority of the cases of this disease; and the climato-therapy is undeniably of great importance. The temperature of the locality should be practically invariable, extremes of temperature are not at all suitable for these patients. Sheltered regions with pine forests are ideal. The dietotherapy he considers of great importance; very often feeding is difficult owing to the tendency to gastric acidity and fermentation. Milk and cream should be given regularly. Eggs, fish, fowl, roast mutton, and clear soups are very nutritious as well as stimulating. Avoid foods which produce fermentation. In

the early stages of the disease the child should be fed up, and in the latter stages the appetite tends to fall off, and must be stimulated by simple bitter tonics combined with malt extract.

Drug treatment in this disease is a vexed question, for there is practically no remedy which will cure, though there are several which may improve the patient's condition. Cod-liver oil in not too large doses—to a child five years old, 30 drops, 2 or 3 times a day, 1-2 hour after eating. It is best given combined with malt extract which serves to disguise the taste.

The writer refers to several other of the drugs indicated but fails to observe the great value of radiant light and high-frequency currents with these little patients, which probably when judiciously administered are capable of instituting an increased general metabolism as well as raising the general resistance of the patient. There are few of these little sufferers that cannot be treated successfully by the combined applications of these two agents, to which may be added the application of the wave current over the abdomen in connection with the hygienic measures suggested. (Editor.)

Some Points in the Sanatorium Treatment of Pulmonary Tuberculosis. By C. Muthu, M. D., M. R. C. S., L. R. C. P., Archives of the Roentgen Ray, December, 1906.

The writer speaks with pride of the success obtained by the pioneers of the open-air treatment during the last nine years in private sanatoriums. The expectations, however, of the public and the profession are placed too high as to the average result that should be obtained, consequently discredit unjustly falls on the whole movement. Speaking from the writer's point of view, from his own institution in which he has carried out the open-air treatment, in at least 50 per cent of the cases, life and health are restored by the open-air treatment—that is, about one-half of the patients that enter the sanatorium either get well completely, or their diseases are arrested so as to enable them to return to work. He deplores the fact that many patients return to unhealthy surroundings when partially patched up, and soon relapse, also that the medical men do not send them over at an early stage of the disease, that too many patients at the first sign of return of health, go home thinking they are cured; the institutions which cannot keep patients for more than two to four months, then send them back to their

former surroundings, and treatment of patient at home; where no medical supervision or discipline is possible. Such cases result unfavorably. The most important cause of failure is discontinuance of treatment too soon from various causes. Rigid discipline, absence from home and friends, etc., are unpalatable, and it is most difficult to convince patients that health can only be got back by great sacrifice, and that Nature demands strict conformity to her laws. Patients have not the strength of character or stamina to stand fast or strenuously continue in the fight against the disease. The article is illustrated, showing the interior and exterior of the châteaux, or small open houses in which these patients are sheltered. The open-air treatment is, after all, a palliative remedy. It is not a specific against consumption. He deplores the fact that such centers as London, Glasgow, and Manchester, which are breeding places for dust and microbes, remove any hope of eradicating the disease; deploring also the evil factors of drink, overcrowding, poverty, competition, etc., which sap the vitality, energy, and resisting forces, and do not permit the hope of eradicating the disease, in the future years. The writer refers to no other therapeutic measure whatever in his work except the open-air treatment.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Exophthalmic Goiter Treated by the Roentgen Rays.

Drs. G. E. Pfahler and Thrush (New York Medical Journal, November 17, 1906) furnishes notes of exophthalmic goiter treated by X-rays. The symptoms were well developed in a woman of thirty-six years old, and she was given twenty-two applications of ten minutes each spread over twelve weeks. Improvement was noted in the fourth week and resulted in a cure in the twelfth week. In addition to X-ray, iodine, valerian, sumbul, asafetida, nitro-glycerin were used. Pfahler bases his remarks on thirty-one goiter cases treated by the X-rays, which treatment he thinks is proper and effective.

Effects of X-rays upon Ague. N. Y. Med. Jour., November 10, 1906.

A case has been reported in which a quotidian intermittent was apparently cured by X-rays. Demarchi, after applying this method in eight cases, was unsuccessful in obtaining only

negative results. He demonstrated to his own satisfaction that the exposure of the splenic region to X-rays did not in any way modify the course of the malarial infection nor the cycle of evolution of the pathogenic agent. However, in cases of chronic enlargement of the spleen, radiotherapy brought about the manifest diminution of this organ, but only after the spontaneous cessation of the fever, or as a result of the administration of quinine. The possibility of a preventive influence of the X-rays against recrudescence of the fever is admitted by the author.

Treatment of Venereal Buboës by X-rays.

Merxheimer and Hubner have obtained positive results by radiation in the treatment of enlarged lymphatic glands, both venereal and strumous. The application of the X-rays should be energetic and be made with a high vacuum tube; the exposures of half an hour are repeated twice a week. The testicles are to be protected with a plate of lead and the bubo also covered with a sheet of tin in order to protect the skin from injury from the low vacuum rays which might escape from the tube. Two exposures are all that is sufficient to cause the disappearance of a gland as large as a hen's egg. The treatment is not effective after suppuration has occurred, but after the evacuation of the collection the application of the X-rays can take the place of the curette and the wound generally granulates very quickly.

The Cosmetic Advantages of Treating Malignant Growths of the Eyelids with Radium. New York Med. Jour., December 22, 1906.

Kirchner has reported in Archives d'Electricité Médicale, to have cured two relapses of epithelioma of the eyelids with one milligram of radium bromide. In the two cases the whole thickness of the eyelid was involved in the growth. The first case Kirchner treated by a series of sittings each lasting twenty minutes. The second case was treated in one sitting. Each case was cured without a cicatrix and the function of the eyelid was retained.

Errors in the Treatment of Cutaneous Cancer. By A. R. Robinson, M. D., New York, N. Y. Med. Jour., December 29, 1906.

This very learned article by its eminent author well deserves careful perusal by every man who pretends to treat malignant

diseases. He is certainly correct in his dictum that there is at present no one agent that should have absolute and untrammelled sway in the treatment of malignant disease. He thinks that the thyroid extract with other internal means is very useful as an adjunct to the X-ray and other agents in the treatment of many cancerous conditions. He makes mention of one case in which a carcinoma appeared and grew very rapidly after high-frequency applications. He had found previously in this same case while under his care that the X-ray had not affected it favorably. The case progressed to an unfavorable termination in spite of thyroid extract and trypsin. The thyroid extract in the early days of this case had acted favorably. He considers the use of toxins and serums to be useless and where used usually cause loss of valuable time. He believes that the most favorable methods for the removal of cancer at the present time are excision by the knife, destruction by thermo-cautery or by galvano-cautery, radiotherapy, curetting and caustics. He holds that that method of treatment is best which removes with the greatest certainty all of the pathological tissues, even if the resulting deformity is greater than that caused by some other and less effective method. He does not believe that cancer depends in all cases upon a specific organism. He thinks if the lesion is smaller than a pea in size and deep-seated and not located upon a part as the end of the nose, the eyelid, etc., it can be removed by excision or by cautery. If it is on the scrotum, excision is the proper method. He thinks that an epithelioma of the same size if located upon the face, and superficial, should be treated by the X-ray, as the scar is less and a permanent cure is much more probable. In all cases where flat epitheliomata are larger in size than a bean, unaccompanied with lymph or gland infection, excision should not be employed, unless the deformity is of no consequence. In rapidly spreading epitheliomata, a rare form of cancer, operation by excision offers the most favorable prognosis, and should invariably be the method used, even if the results are not successful. In these cases, he considers caustics and radiotherapy should not be depended upon, but should be used after extirpation.

Large, flat epitheliomata, occupying areas of two inches or more in diameter should not be treated by the knife, as caustics or the X-ray or both combined, as indicated by the case, will give results which could not possibly be obtained by attempted excision. I may safely say that excision should never be attempted in a case of this kind. He says that cancers of the lower lip, unless they are very superficial, should be excised. Caustics or the X-ray are inefficient in the majority of these cases. Cancer of the upper lip is much more amenable to caustics and X-rays and should be used in these cases. In the

rodent ulcer form, the X-ray is always preferable. He says that he does not consider the curette to be relied upon exclusively in any case of cancer. He considers it sometimes useful in removing masses of pathological tissue before the application of caustic or the X-ray. He thinks the X-ray is a decided addition to our armamentarium against cancer, but that its virtue has been exaggerated.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Hydrotherapy in Rheumatism.

Dr. H. H. Sanderson (in the Cal. State Journal of Med.) calls attention to the fact that this method is by no means new, although the use of water in rheumatism has for the most part been empirical.

People need to be taught that chronic or recurrent rheumatism is a serious affection which is likely to lead to permanent disablement, and that it should be taken hold of and treated in an intelligent manner.

In connection with the treatment a proper diet should be instituted. The indications are for one that will be freest from uric-acid-forming material, one that will best agree with the peculiar conditions of the digestive organs and alimentary canal and will most effectually nourish the patient.

The elimination of the rheumatic material and other toxins from the system is to be accomplished by free water-drinking and hot applications. The patient should drink not less than from four to eight pints of water daily. After a few treatments he will perspire freely. Hot applications may be in the form of hot blanket packs, fomentations to the affected joints while the patient is covered with a warm blanket, the hot full bath, the mud bath, the hot-air bath, or the electric-light bath. The imperative need is that whatever treatment is used, it should be hot; that free perspiration be invoked; that the extent of the treatment be adapted to the strength and vitality of the patient; also, that a proper after-treatment be employed. This after-treatment should be a cold application—one that is decisive, and one that will bring about a reaction which will be felt by the patient and adapted to his condition. Mild measures can be used at first in doubtful cases, and at each succeeding treatment lower the temperature one or two degrees until a favorable minimum temperature is reached.

When a patient is taken from the sweat bath, he is first placed under a douche at a temperature of 110° or 115° for one or two minutes, and the cold douche instantly turned on for fifteen

to thirty seconds at a temperature as cold as the patient can react from, varying from 80° to 60°. The patient is dried thoroughly and quickly, and if any of the symptoms of the disease are acute, as may be indicated by the presence of fever, he is placed in a warm bed. In chronic cases where there is no fever, the treatment is followed by massage and exercises.

In acute and subacute cases where the joints are painful and swollen, compresses should be continuously applied between the hot applications. A soft cloth wrung out of water at 60° is wrapped round the joints and snugly covered with a flannel of three or four thicknesses. The compress is changed whenever it becomes heated by the feverishness of the part.

The form of hot treatment that is to be used should be selected with care. In acute cases the fomentation or pack is best. It can be given in the room, either on the bed or on a cot. The hot-air baths have some advantages for the chronic cases. The dryness of the atmosphere and the extent of heat that can be obtained have a favorable influence on metabolism and tissue change. With this bath the internal temperature is raised, materially favoring oxidation and elimination. This rise would rapidly fall with the cold douche which followed, and would again become normal after a half-hour's rest. The electric-light bath has advantages over the other forms of dry heat. The light rays are more penetrating, being communicated by radiation rather than conduction. The patient perspires at a very much lower temperature, and the bath can be borne by the patient with less depressing results. In chronic cases with large and painful joints, Dr. Schuller uses the Scotch douche, which consists of a rapidly alternating hot and cold stream poured against the affected joint with varying pressure.

Abdominal Palpation in the Warm Bath.

Stricker (*Centralblatt für Inn. Medizin*) originally advocated this method thirteen years ago. It permits palpation of abdominal parts and organs much more deeply than the ordinary methods practiced, and it can often replace, on this account, examination under an anesthetic. The author has diagnosed, by means of the warm bath, displacements and adhesions of the abdominal organs, atrophy and enlargement of the liver, the spleen, and kidneys, calculi in the gall-bladder and renal pelvis, exudates and tumors which could be felt vaguely or not at all by ordinary methods of palpation. (*Modern Medicine*, February, 1905.)

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Pancreatic Ferments in the Treatment of Cancer and their Rôle in Prophylaxis.

Margaret A. Cleaves (Med. Record, December 8, 1906) reports the treatment of two cases of malignant disease by injections of pancreatic ferment, and her conclusions drawn therefrom.

One of these was an epithelioma of the tongue, recurrent, and inoperable at the time that treatment was instituted. The treatment was continued for four months, and now, save for a ferment mouth wash the patient has had no treatment for six months. She is said to be in good physical condition, and to be free from all of the distressing symptoms characteristic of that condition and from which she previously suffered.

The second case, which is described at greater length, is an adeno-carcinoma of the rectum. The diagnosis was made by microscopical examination at the Massachusetts General Hospital. At the time the case came under observation seven months ago the disease was of two years' duration, three operations had been performed, and the condition was considered inoperable.

The symptoms present were: loss of flesh; weakness as shown by inability to stand or walk alone save for a few moments only, and for very short distances; pain requiring the use of opiates; obstinate constipation, and a foul-smelling discharge. "Rectal examination gave to the finger the sensation of passing through a narrow canal surrounded by hardened plaster of Paris, save at the site of the original lesion, one and a half inches from the internal sphincter, where the tissues were, in addition, in a condition of cauliflower excrescence. The examining finger and the irrigating catheter penetrated to a depth of four inches." Treatment has continued ever since (for six months).

The patient has gained in weight and strength, can do some professional work, can walk short distances alone, and without support, has a good appetite, and little pain. Examination shows the rectal walls softened, the cauliflower excrescence much diminished, and the catheter can be passed to a distance of fifteen inches.

Microscopical examination of the discharging tissue shreds is said to show "adenoma with simple inflammation."

From this case Dr. Cleaves infers that, "in the pancreatic ferments there is to be had an agent capable of keeping an adenoma from merging into an adeno-carcinoma, and therefore

they are to be regarded at least as prophylactic against the development of malignant disease."

Experimental Studies in Eclampsia.

W. Weichardt and W. Piltz (Deutsche medizinische Wochenschrift, vol. xxxii, no. 46) by isolating a toxin from the placenta of eclamptic women and inoculating rabbits, claim to have produced an immune serum which will check the progress of eclamptic symptoms after their development following the injection of the toxin producing them. This toxin, they find, is derived from cystolysis of the elements of the placenta, and, entering the circulation, induces eclampsia in those women in whom the protective, inhibitive, or antitoxic substances are deficient. They have isolated from the toxin a blood-coagulating element, and one which paralyzes respiration. They think that if they were able to ascertain the women with this predisposition to eclampsia, they might supply the deficient protective substances, and prevent the development of symptoms as effectually as in their experimental cases.

The antitoxin substance, they claim, is harmless, and as it readily dialyzes, is as efficient by mouth as subcutaneously.

Suprarenal Extract in Urinary Retention due to Prostatic Enlargement.

A. E. Prince, in the Jour. A. M. A., January 1, 1907, describes gratifying results in three cases in which suprapubic aspiration seemed inevitable. The technique and details are as follows: "I prepared a solution by adding a small quantity of 0.1 per cent. solution of adrenalin to an equal amount of 4 per cent. cocain solution. With this I filled an ordinary pipette, and injected it into the catheter, allowing it to gravitate to the tip. I then inserted the end of the pipette into the upper end of the catheter, closing it and thus preventing the solution from escaping. The catheter was then introduced as far as possible without discomfort, and the solution injected from the catheter by pressing on the bulb of the pipette." In each case, he says, "After waiting a short time the catheter passed into the bladder."

As cocain, when applied locally, is itself a marked vasoconstrictor, and causes a decided shrinking of mucous membranes, and besides, by its anesthetic effect, can relieve to a considerable degree any existing spasm, it does not appear reasonable to us to give all of the credit to the adrenalin. In one of the large hospitals, during the past year we have seen a number of cases of urinary retention, due to this and

other causes, in which a combination of adrenalin and cocain was used locally. It was the general consensus of opinion that the adrenalin played a very minor rôle; and that while there were congestion and swelling of the mucous membrane, yet the chief factor in producing the retention was the reflex spasm caused by the local irritation. In a certain number of cases cocain alone gave practically the same results. Of course there will at once arise in the minds of many the objection to using a not inconsiderable amount of cocain in the urethra. We, personally, have never seen a case of acute poisoning occur from the use of cocain in this manner.

The Antitoxin Treatment of Tertian Malarial Infections.

J. H. Ford (Jour. A. M. A., vol. xlviii, no. 2) gives his results in a series of cases of malarial infection, from the administration, subcutaneously, of a serum containing an antitoxin developed by inoculating animals with defibrinated human blood containing the plasmodium vivax. These investigations were carried out in Malabang, Mindanao, P. I. The animals employed were monkeys and goats. The antitoxin appeared to be developed to a greater degree in the former animals. At no time following inoculation, were plasmodia demonstrable in the blood of either animals.

In twenty cases of benign tertian infections treated by this method, fourteen recovered after one injection, three required a repetition of the injections, and three were uninfluenced by the treatment. Two cases of quartan infection and five of estivo-autumnal were uninfluenced. Controls were used throughout the experiments.

From these results he concludes that successive inoculations of monkeys or goats with blood containing the plasmodium vivax produces in those animals an antitoxin which, when injected in adequate doses into human beings, may be followed by the disappearance of the parasites from the circulation and disappearance of the symptoms of malaria. He also concludes that this antitoxin has a degree of specificity as it has no apparent influence on infections caused by a variety of the malarial parasite other than that by which it is developed.

The Serum Treatment of Thyroidism.

J. Rogers (Jour. A. M. A., September 1, 1906) gives the results of the administration of a specific serum in this condition. This serum is prepared by injecting the nucleoproteids and thyreoglobulin separated from the human thyroid gland into the peritoneal cavities of rabbits, dogs, and sheep. It is sup-

posed to contain an antibody or cytotoxin specific in its action on the thyroid epithelium, and an antitoxin for the thyroglobulin, which is believed to be the toxic product of the gland. In obtaining the earlier sera substances from pathological thyroids, only, were injected. Later substances from normal glands were used. The differences in the action of the two sera thus obtained do not seem to be of great importance.

In 71 cases treated by this method there were 11 cures, 42 improvements, and 4 deaths. None of the deaths seemed to be due directly to the administration of the serum. There is, however, a marked reaction following its injection in many cases and great caution has to be taken in its use. The acute cases show the best results. They require the least serum, and exhibit the least reaction following its injection. The chronic cases with severe symptoms have not yielded so promptly to treatment, while the atypical chronic cases show practically no benefit whatever.

The Opsonic Index in Typhoid Fever.

C. P. Clark (Jour. A. M. A., December 29, 1906) draws the following conclusions, based upon a study of 33 cases. He finds that the opsonic index shows a marked rise in the beginning of the disease; that it varies somewhat from day to day; that it falls with the subsidence of the temperature; and then rises again as convalescence progresses. He thinks on account of the high index early in the disease, that it may prove of value in early diagnosis. No attempts have been made as yet to put it to any therapeutic use.

BOOK REVIEWS.

RHYTHMOTHERAPY. A Physiological Discussion of the Basis and Therapeutic Potency of Mechano-vital Vibration, to which is added a Dictionary of Diseases with Suggestions as to the Technic of Vibratory Therapeutics, with Illustrations. By SAMUEL S. WALLIAN, A. M., M. D., President American Medico-Pharmaceutical League, Ex-president Medical Association of Northern New York, Member New York State and County Medical Societies, Fellow of the American Electro-Therapeutic Association, Member Medico-Legal Society, Associate Editor Medico-Pharmaceutical Journal, etc. Published by The Ouellette Press, Chicago, Ill. Price, \$1.00 net.

In this little volume the writer in the first place disclaims the employment of a preface, a rather unique position, as the preface usually is supposed to define the author's point of

view. He also disclaims all association in his work to the history of the subject. The burden of the author's consideration is rhythmic vibration. The difficult problem seems to be to discover and apply the appropriate rhythm, to the conditions as they arise. The writer touches upon the general scope of what he considers natural therapeutics, attributing and according to each an appropriate place. Rhythmotherapy he desires to have accorded a place with the other recognized measures, distinct from mechano-therapy, under which nomenclature has generally been considered mechanical vibration. The writer devotes paragraphs to the consideration of nomenclature, rationale of vibratory therapeutics contrasted with massage, consideration of trophic centers, stimulation, elimination, etc. He shows and describes in detail the vibrators, and describes the technique of treatment. He gives considerable thought and attention to dietetic mistakes and dietetic signs. The last half of the book takes up briefly the consideration of treatment by the author's methods of numerous diseases including in the list a larger part of the diseases known to medical science. The volume is unique in many particulars and will be read with interest.

SURGICAL SUGGESTIONS. PRACTICAL BREVITIES IN SURGICAL DIAGNOSIS AND TREATMENT. By WALTER M. BRICKNER, M. D., Chief of Surgical Department, Mount Sinai Hospital Dispensary, New York; Editor, *American Journal of Surgery*, and ELI MOSCHCOWITZ, M. D., Assistant Physician, Mount Sinai Hospital Dispensary, New York; Editorial Associate, *American Journal of Surgery*. Duodecimo; 60 pages. New York: Surgery Publishing Co., 92 William St., New York, 1906. Cloth, 50 cents.

This little volume contains a list of practical brevities in the line of the present status of surgical science, as derived from the surgical experience of the writers. The work is arranged in unique style, beginning with the head, and passing down over the neck, thorax, abdomen, including the organs in each region and the surgical procedure, and conditions arising from the same, closing with the extremities. He then considers various general classifications as fractures, wounds, tumors, instruments, anesthesia, etc. The 250 suggestions contained are presented in a manner which will impress them upon the reader's memory. The little book will be appreciated by the general practitioner and the student. It is printed on heavy paper and bound in cloth.

PROGRESSIVE MEDICINE, Vol. IV., December, 1906. A Quarterly Digest of Advances, Discoveries and Improvements in the Medical and Surgical Sciences. Edited by HOBART AMORY HARE, M. D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. Octavo, 349 pages, with 29 engravings. Per annum, in four cloth-bound volumes, \$9.00; in paper binding, \$6.00, carriage paid to any address. Lea Brothers & Co., Publishers, Philadelphia and New York.

This number of this valuable serial begins with an article by J. Dutton Steele, M. D., on the Diseases of the Digestive Tract and Allied Organs. He reports the X-ray treatment of Esophageal Cancer from the writings of W. Wendle, that by means of esophagoscope he believes that he has solved the problem with the use of the Roentgen ray in cancer of this region. In one case marked results had taken place over the site of exposures. He considers the significance of the Weber test and various modifications in detecting gastric ulcer. He states that "the statement that occult bleeding occurs in every stool in ulcerated cancer" should be modified, as cases have been shown in which hemorrhages have been intermittent. He favors the employment of hydrotherapy and electro-therapy in connection with treatment of stomach diseases. He devotes considerable space to the radiograph examination with diseases of the stomach by the employment of large quantities of bismuth subnitrate before taking the skiagraph; by this means showing the various irregularities in the contour and position of the stomach. He considers the employment of mechanical measures in the treatment of constipation, but has failed to discover mechanical vibration and static electricity as valuable in the treatment of this condition, quoting rather from Erb's clinic of long ago, the value of the Faradic current. The subject is treated with thoroughness and in a practical manner in most respects in this portion of the volume.

Dr. William T. Belfield considers the treatment of Genito-Urinary Diseases, considering pathological conditions in the affections of this region. He treats the management of prostatic cancer from the operative point of view, reporting from one set of cases, showing that in 20 of 43 cases, in which extirpation was undertaken, death followed immediately after the operation, one survived five years, one five and a half years, but the majority showed prompt recurrence. He discusses the methods of treatment of prostatic hypertrophy by

irrigation but has failed to note any benefit as others have from physical measures.

John Rose Bradford considers in a brief article the conditions and treatment of diseases of the kidneys. The chapter on Fractures, Dislocations, and Surgery of the Extremities by Dr. Bloodgood is exhaustive, and is a practical collection of facts and methods. It also considers Bier's treatment by hyperemia of these conditions, as well as surgery of the joints.

The closing article, a therapeutic referendum, considers therapeutics from the drug point of view, giving some attention to the employment of toxins, but no space whatever is devoted to the employment of physical measures. The December number is an excellent one, and contains very much that is valuable to the specialist and general practitioner.

CONSERVATIVE GYNECOLOGY AND ELECTRO-THERAPEUTICS. A Practical Treatise on the Diseases of Women and Their Treatment by Electricity. By G. BETTON MASSEY, M. D., Attending Surgeon to the American Oncologic Hospital, Philadelphia; Fellow and ex-President of the American Electro-Therapeutic Association, etc., etc. Fifth, Carefully Revised Edition. Illustrated with 12 Original Full-page Chromo-lithographic Plates of Drawings and Paintings, 15 Full-page Half-tone Plates of Photographs made from Nature, and 157 Half-tone and Photo-engravings in the text. Complete in one Royal Octavo Volume of 467 pages. Extra Cloth, Beveled Edges. Price, \$4.00 net. F. A. Davis Company, Publishers, 1914-16 Cherry Street, Philadelphia.

It is with pleasure and satisfaction that we are called upon to review the fifth edition of this valuable work of Dr. Massey's. Its appreciation by the medical profession is evidenced by the fact that another edition has been issued within one year of the appearance of the fourth edition. It must also be conceded that the prejudice so long existing in the professional mind against the employment of electricity is waning. In this volume the writer has added to the fifth edition the technical consideration of the constant current as derived from the street mains, bringing it up to date, and has also elaborated the chapters on the cataphoric treatment of cancer. The volume is the most comprehensive work on the subject in the English or any other language, and should be in the possession of every progressive physician.

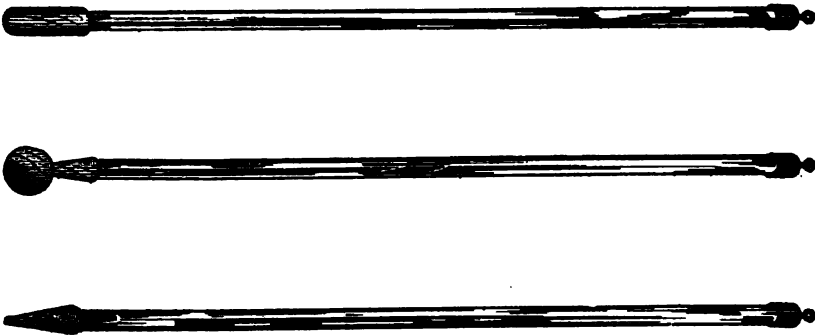
NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

NEW ELECTRODE FOR BRUSH-DISCHARGE.

One of the most useful modes of treatment by static electricity is with the effleuve or brush-discharge. But it has not received the attention due to so valuable a method, because of the unreliability of the medium employed to obtain this characteristic discharge.

The best electrodes heretofore used were made of wood in a variety of shapes, the most common being with point,



cylinder, and balls tips. When the wood is green, or if kept at the right degree of moisture and temperature, they work tolerably well for a short time. They give so much trouble that, most physicians have not the time or patience to bother with them. Therefore a very valuable mode of treatment has fallen into disuse with them.

Recognizing the latter fact, as well as the need for so useful a mode of treatment, led to the new electrodes illustrated herewith, which, after the name of the inventor Dr. E. T. Nealey of Bangor, Maine, are called "Nealey's Fluid Electrodes."

The illustration furnishes an idea of the adopted form for a set of these new electrodes, from which a handsome blue brush can be obtained in a mild, medium, or heavy discharge, suitable for all requirements. The shaft of the electrodes is a

piece of heavy glass tubing with a small orifice, at one end is fitted a wooden tip, at the other end a brass ferrule with eyelet, for attachment of the ground chain.

The tube is filled with a fluid of proper resistance for the size of machine with which they are to be used. This is very important, as therein lies the secret of the success of these electrodes over all other devices for getting a brush-discharge.

They are always ready and work at once. The only care needed is to keep the glass tube full of the resistance fluid. This fluid keeps the wood sufficiently moist for every-day use, and acts as a rheostat, to choke back the current so as to produce always a spray instead of a heavy spark.

If the electrodes are left unused for a long time, or kept in a hot, dry room, the surface of the wood will get dry, and should be plunged into water once before using, when they will work as well as ever. The wooden tips do not carbonize as do the ordinary wooden electrodes, therefore, barring accidental breakage, a set will last several years, thus being the most economical to buy.

Under favorable conditions, from a sixteen revolving plate static machine, a heavy brush, twenty inches in length, has been obtained with one of these electrodes.

The expressed opinion of every physician to whom they have been properly shown has been that, they are the best thing ever devised for brush-discharge treatment.

Arrangements have been consummated by which Van Houten & Ten Broeck Co., 300 Fourth Avenue, New York City, is to manufacture and sell these new electrodes. Price of the set with a bottle of the solution, \$7.50. Single electrodes, \$3.00 each.

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THE PRESENT STATUS OF ELECTRO-THERAPY.*

BY H. H. ROBERTS, M. D., M. E. T., LEXINGTON, KY.

Any advancement in science, transportation, or other methods for the health, pleasure or convenience of the general public is usually received with a certain amount of skepticism.

The users of sledges viewed with jealous envy the introduction of the wheeled vehicles. Old cartoons illustrated how the fast coaches alarmed the pedestrians, scattered the flocks and herds, and produced a feeling of indignation and distrust throughout the community. The advent of the railway system was classed as an outrageous nuisance, a menace to the public health, peace, and happiness.

We all know how the early users of the bicycle and automobile have been detested, denounced, and sorely persecuted. Yet the public has had to lay aside this prejudice and receive the conditions of the new traffic as invaluable and indispensable to both social and industrial life. Let us turn the comparison to the medical world. We can hardly grasp the situation so rapid have been the strides in the rush of progress. Every advancement, every method, every system and theory has been received with some doubt by the profession and with interest and hope by the laity. It has always been so since the days of Hippocrates down to the present century, waves of enthusiasm and waves of depression following each other consecutively. Many of the methods and systems of therapy have been founded upon sound reasoning and plausible theories. Many have fallen into disrepute by the failure of the proper knowledge of those who administered the treatment. During all these spasmodic periods of enthusiasm and depression among the medical fraternity, the public has been restless and anxious, grasping at

* Read by title at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association, September 20, 1906.

first one system and then another, hoping to receive a Panacea for health and long life.

We know how the medical profession is flooded with the countless chemical products every month, many of which are worse than worthless. The patent and proprietary preparations are so numerous that we cannot realize their magnitude. We have the various specialists, magnetic healers, bone pullers, nerve stretchers, hair raisers, etc., and the public rushes from one method to another until it becomes bewildered in the therapies, pathies, isms, etc.

With all the advancement of theories, methods, and systems nothing has been received with more confidence and interest than electricity as a therapeutic agent. Periodical prominence of it has passed through the medical profession for many years to be followed by periods of obscurity. The interest and enthusiasm were produced by early pioneers and the results of these earnest and conservative workers who sought to improve upon the old methods and accomplish new achievements. The periods of depression were produced by the careless operators and the owners of inferior and non-therapeutic apparatus; they failed through lack of proper knowledge to secure result and blamed not themselves but the theory.

Several years ago a doctor asked me to examine his battery, stating that he was using a galvanic current upon a case of chronic rheumatism. When I informed him that his battery was only a faradic, and an old type at that, he left in disgust, perhaps believing that his apparatus was capable of producing not only the galvanic current but the faradic and static as well. Such cases as this have made it more difficult to convince the medical profession and the public that there is merit in electro-therapeutics.

Times have changed, and with this change have come enlightenment and confidence in electro-therapy. The earnest and conservative workers have been rewarded by seeing their efforts placed upon a high standard, there to remain and to be recognized as one of the most important branches of modern therapy. With all of this enlightenment and progress I fear that many of us have become too enthusiastic and are not willing to follow the time-tried methods. The increase of the manufacture of electrical apparatus has arrived at a magnitude that

is becoming alarming. There is no standard or uniformity with the various manufacturers, each constructing his apparatus along lines to suit his own idea or fancy, regardless of what the therapeutic result may be. This makes it difficult for operators to make comparisons in their work. Many of the apparatus are complicated and bulky. These instruments are an ornament to the office, and may perhaps produce a fine moral effect upon the patient. Is it not possible that we are progressing just a little too fast and departing from time-tried laws and facts?

When static electricity was introduced to the medical fraternity in 1750 its advocates perhaps had hopes of a brilliant future, but we know outside of a few workers little prominence was given it until 1885. The demonstrations then certified the work of the pioneers. Almost every disease treated successfully now was also treated satisfactorily at the earlier period. Perhaps the entrance of the x-ray into the arena of therapeutics has given static electricity a greater impetus than anything else. More static machines are made and sold in a day now than were manufactured in months years ago. From 1895 until the present time static treatment has gone forward by leaps and bounds until we can locate a machine at almost every cross-road in the rural districts and the majority of the city offices are equipped with one or more modern machines. Is there any improvement in the therapeutic results? Do the effects differ from those of the earlier period?

Machines are modernized; the lines are more beautiful, but the current is the same and the electrodes are the same. The public has demanded electrical treatment and is getting it; but are the results satisfactory as a whole?

I fear this impetus given electro-therapy a few years ago has started a stampede into the electrical field by many who were totally ignorant of this branch of science before. Many of these men have not taken the time to become acquainted or to make themselves proficient to use this important science, but are satisfied by equipping their offices with an elaborate outfit and announcing to the public that they are electro-therapeutic specialists. The brilliant colors from the vacuum tube impress and awe the uninformed. What the honest and conservative workers desire is therapeutic results, not psychological effects.

If the beginner would only realize that electricity is generic like medicine and should be administered as a remedy with a clear understanding as to the effect of currents, polarity, dose, and when and how the same should be given, results would be far different.

It is not necessary to have in one's office an elaborate marble slab decorated with numerous switches, knobs, fancy clock-work, lamps, etc., to get the effect of the galvanic, faradic, high-frequency, or static currents. Besides the complicated mechanism of many of the new appliances are more or less expensive, far in excess of their real value.

The manufacturers of many of these ornamental instruments try to educate the physicians as to the therapeutic use of their respective inventions by a no less competent instructor than their traveling salesman, who makes exaggerated claims and claims to know all about them. Some manufacturers go so far as to even guarantee to double or even treble the doctor's practice if he will but purchase the outfit at so many hundred per.

The conservative physician who is honestly seeking to do the greatest good to the greatest number should have a broad and comprehensive knowledge of electro-physics and electro-physiology. He should be able to thoroughly understand the principles which govern the therapeutic effects of the various electric currents, and to recognize those effects when obtained.

The user of electro-therapeutics should be able to judge for himself as to the merits or demerits of the instruments. I feel, therefore, that there is just a little danger of a depression in this wave of enthusiasm which is sweeping over the country and carrying with it many incompetent workers. It is the right man in the right place, with the properly constructed instrument, who is capable of producing the best clinical results.

We know that the effect produced upon all inflammatory tissue by electric currents is based upon a chemico-physical action and when we depart from time-tried laws and seek the psychological effect, we are going backward.

Many of the physicians who are using electricity in their practice to-day have a very small conception of the principles which govern the therapeutic use of electric currents. It is possible for an operator to stumble upon a brilliant result from the use of electric currents without being familiar with either

electro-physics or electro-physiology, but it is an accident and it is hardly possible that lightning will strike twice in the same place.

Electro-therapy is a distinct science, and the man who administers it should be as familiar with its effect and results as the man who administers medicine. How few are they who would be willing to trust to the results of a man who possessed an elaborate display of chemicals, if they knew he was ignorant of their physiological effect! Yet there are scores of men administering electro-therapy daily who have no knowledge of the fundamental principles which underlie electricity as a therapeutic medium.

A physician in a rural district once purchased an induced current (faradic) battery and wrote to the manufacturer to know what the potentials of his battery were and if he could use it for x-ray work.

Electro-therapy is not a "panacea" for all of the ills to which the human body is heir, but in many of the acute and especially the chronic cases more good can be accomplished by the judicious use of electric currents than any other known therapeutic agent.

The most essential requirement for one who wishes to administer electricity is to have an adequate knowledge of physical diagnosis. A careful and systematic examination should be made of the body with reference to all of the vital organs, the secretions, blood, blood pressure, etc.; no matter how prominent the abnormal condition may present itself should be the duty of the physician to make himself thoroughly familiar with the general condition. Unless a man is competent to do this he is not warranted in administering electro-therapy. Upon the accuracy with which this is carried out depends success or failure in any line of treatment.

It is comforting to know that our leading colleges are realizing the importance of a thorough training in electro-therapeutics. Electro-therapy has produced better results in the treatment of diseases of the stomach and intestines than any other known method. Especially is this true in such conditions as atony, chronic gastric catarrh, dilatation, gastritis, gastro-succorrhea, ulcers, hyperchlorhydria, hypochlorhydria, erosions, etc. In intestinal conditions, colitis, coloptosis, entero-

colitis, and especially that modern and fashionable disorder, chronic constipation, brilliant and permanent results are obtained. Rheumatism and faulty metabolism, especially where there is a lack of proper intracellular oxidation, electro-therapy gives splendid results, and especially is this true when a correct knowledge of modern dietetics is used in conjunction. Much has been added to electro-therapy during the past year in the way of ingenious instruments with plausible claims and new theories.

Have we truly advanced in new therapy? Can we not get the same results and more satisfactory from the old, reliable galvanic, faradic, and static as well as from the elaborate and expensive high-frequency outfit with the tangled, twisted, and distorted vacuum tubes? I think we can. The high-frequency currents from the static machine with the ordinary condensers have not been improved upon. Many of the new instruments do not give a high-frequency current at all, but high tension, which is superficial in its effects and worthless for its action upon deep-seated conditions where a constitutional or nutritional effect is desired.

The x-ray workers are doing better work because they are more conservative and the great wave of enthusiasm has reached a healthy quiescence. Conservative and honest men are doing a grand work. The future invites many more such workers. The charlatan and pretenders still exist and will continue as long as time lasts. Men who treat every pimple and ulcer as cancer and have used the x-ray for every disease under the sun simply for a few dollars are disappearing, and the competent men are given the credit which they so richly deserve.

We are making splendid progress in electro-therapy, but I believe we should demand a better standard and uniformity for the condition of electric apparatus, and to some extent put a check upon the enormous and indiscriminate growth of unreliable and non-therapeutic instruments. In this way only can we arrive at a comparison and have uniform results in electro-therapy. In closing allow me to add the axiom,

"Be not the first by whom the new is tried,
Nor yet the last to lay the old aside."

THE TREATMENT OF GLANDULAR TUBERCULOSIS BY THE ROENTGEN RAY.*

BY G. H. STOVER, M. D., DENVER, COLO.,

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While it is a fact that many instances of spontaneous recovery from tuberculous adenitis have been seen by every one of us, that is no reason why there should be the slightest delay in instituting vigorous therapeutic measures in every case that may come to our notice. The disease, while most common in childhood and youth, is not confined to any one period of life. It most commonly arises from chronic throat affections involving the tonsils; it may, however, immediately follow acute inflammations of these very troublesome organs.

It is always a most serious menace to the infected individual; there is always the danger of extension to the axillary or the tracheo-bronchial lymph glands, and from these to the lungs there is but a short path.

The spontaneous recovery may take place in several ways; the resisting power of the individual may increase to such an extent that the infection dies out, leaving a cicatrized knot; caseation may take place, leaving nothing but a sac containing cheesy material, with, in all probability, a greater or less number of the specific micro-organisms awaiting an opportunity for freedom and the chance to do further damage; or suppuration may take place, draining the infected area, and finally healing by means of a disfiguring scar, to say nothing of the possibility of amyloid disease due to prolonged suppuration.

The cases of mesenteric-gland tuberculosis are not so many as those which make up the classes just spoken of, but the disease is no less dangerous, here.

Casting out the policy of waiting to see if there will be a spontaneous recovery, as being one of practically criminal delay, what methods are left to us?

In the first place, measures should be taken to raise the vital

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forces of the patient to a point where they will assist in overcoming the infection and the effects of the infection; but experience has taught us many times that these measures are not always sufficient.

Surgery comes nobly to aid by removing the diseased glands and the surrounding infected tissues, but it is too often found that the work once begun, is never ended; operation after operation is done as newly infected glands appear. And these operations are not matters of little import; practically every operation upon tubercular glands, when thoroughly done, is a major operation, and a dangerous one; the shock, the hemorrhage, the damage often done the lungs by an anesthetic, all are severe taxes upon the vitality of an already debilitated system. The scarring that results, while but a small matter as compared to the advantage of the removal of deadly material from the body, yet is something to be considered.

Happily, however, we now possess a remedial measure practically devoid of danger (in proper hands, of course), which does not subject the patient to shock, which is not attended by loss of blood, which does not necessitate confinement to bed with its attendant evils, which does not take a bread-winner away from his employment, which is not followed by disfiguring scars, and in addition to the positive value of the Roentgenization of the lesion itself, I believe that the fact that the patient, during the treatments is subjected to the action of the very rapidly interrupted magnetic field from the core of the Ruhmkorff coil, gives him a very useful tonic, which does not involve the putting of drugs into the stomach.

And this is a very good time for me to make my usual statement, that, although I believe we have here a remedial agent of very great usefulness, I do not intend to say that it is an absolute and unfailing specific; but I will say, nevertheless, I do not believe I have had a single failure, where a proper opportunity has been had.

In a former paper upon this subject I said I was giving fluorescin internally to patients undergoing Roentgenization for this disease, and remarked, "I am somewhat under the impression that the use of fluorescin is useful, but I am not prepared to make the statement definitely as an assured fact." For some time I gave fluorescin to every patient who received

the Roentgen ray at my institution. I have discontinued the practice as I was unable to convince myself that it had any effect.

When a patient with tuberculosis of the cervical glands has a throat condition which seems to be a factor in promoting the trouble I always refer him to someone who can remedy that condition, and I regard it as important that pathological conditions in the throat should be carefully looked after in these cases.

I sometimes suggest that syrup of the iodide of iron be administered; it seems to do good at times, but in most of my cases, no medicines at all have been given.

I shall not talk farther upon generalities, but will recite some case histories which tell their own story.

Case No. 31. Referred by Dr. W. B. Craig. Young woman. In speaking to me about this patient, Dr. Craig gave me the cheerful information that if she lived many months it would, in his opinion, be a miracle, and really what I saw for a time of her condition seemed to bear out his statement. She was very anemic; her stomach was so badly conditioned that hardly any food and no medicine could be retained; she was having a profuse and exhausting metrorrhagia every two weeks, with a great deal of pain; she was so weak that a number of times she fainted from exhaustion after getting to my office; and in addition to all this, the family being in very poor financial circumstances, upon her devolved most of the care of a house and her invalid mother, helpless from cerebral softening; she tried, and succeeded, by writing stories for magazines to aid the family exchequer. Her tubercular glands were on the right side of the neck, and one of them had been suppurating for several months. There was also a suspicious induration in the right breast. Her treatment began in January, 1903. The neck and breast were Roentgenized and improvement locally was soon manifest, progressing steadily to a cure. I also gave her static electricity to improve her general condition, and for its effect upon the uterine irregularities, with prompt results. As there were some moist râles in the apex of the right lung I applied light from my search light to this lung, with the result that the signs of lung disease disappeared. For a time after recovery from the glandular tuberculosis had been well

established, she had tuberculosis of the cervical spine, or at least such was the diagnosis made by myself, Dr. Craig, and Dr. S. D. Hopkins the neurologist; the spine was Roentgenized, and recovery took place from this condition also. For some time her health has been very good. She is plump, eats well, sleeps well, has done a good deal of rather notable literary work, but she does not at present menstruate, as she is married and well advanced in a pregnancy unattended with the slightest trouble; before pregnancy occurred her menstruation was regular and normal.

Case No. 40. Referred by Dr. S. D. Van Meter. Miss C., young woman. Tubercular glands of the neck for many years; repeated suppuration in various places. Came to me in March, 1903. Immense mass of large diseased glands under each ear and under the jaw in front. The masses on the sides of the neck were fully as large as my fist, which is not a small one. She was Roentgenized for a year. At the present time an observer ten feet away from her would hardly notice a sign of the former trouble.

Case No. 84. Referred by Dr. J. N. Vroom. A boy of twelve. His mother had died of pulmonary tuberculosis. The boy has always been in delicate health; had a chain of tubercular glands on each side of neck. He was Roentgenized during five months, when there was no tangible evidence of enlarged glands. Some little time after stopping treatment I was informed that he had gained some twenty pounds in weight and was in much better health than ever before; this condition obtains at the present time.

Case No. 47. Mrs. B. Referred by Dr. Macomber. Chain of moderately affected glands on each side of the neck. During three weeks of treatment she began to show improvement, but at the end of that time business reasons called the family from the city.

Case No. 147. Young man, referred by Dr. J. N. Hall. This patient had a large mass of tubercular glands on each side of the neck which were beginning to soften. He also had a severe pulmonary infection. The glands soon suppurred, and his condition becoming very serious from the pulmonary disease he was sent back to his home.

Case No. 219. School-teacher, aged about thirty-five. Re-

ferred in September, 1904, by Dr. H. W. Rover. A chain of large glands on each side of the neck, some of them as large as a pigeon's egg, and several of about the same size under the chin. After twenty-five treatments, an intermission was taken, and improvement which was for some time well apparent, continued. At the present time nothing is visible except the cicatrized remains of the former glands. During the treatment of this patient I noted an occurrence which I have also observed in other instances of Roentgenization of the neck; that is the fact that an erythema is very apt to develop upon those parts of the skin which are subject to friction or pressure from the collar, appearing at an earlier period and in a more severe form than that which at times appears in other parts of the skin.

Case No. 273. E. P. McD., young man, referred in February, 1905. Masses of large glands on each side of the neck and under the chin. Under treatment these became much smaller, and all signs of acute process disappeared. At the present time there are numerous lumps at the site of the glands, but they seem to be either cicatrices or caseations. This young man thought he would improve upon my technique and reap correspondingly greater benefit in proportion as he decreased the distance between his skin and the surface of the tube, so when not under observation during an exposure he would get very near the tube, with the result that he got a marked dermatitis which took a long time to heal.

Case No. 293. Miss M., aged about forty, school-teacher, referred in May, 1905, by Dr. Leonard Freeman. Numerous enlarged glands in each groin, a large and acutely inflamed one in the left axilla, a chain of small ones in the right side of the neck, a lump the size of an almond in the left breast, and a number of very large mesenteric glands could be palpated in the abdomen, as she was quite thin. She had suffered from intermittent diarrhea for several years, and had a daily rise of temperature. Fluorescin was used in conjunction with the Roentgenization. After fourteen treatments her fever ceased and after the nineteenth exposure the diarrhea did not return. She gained in flesh and in ability to work. During the summer vacation the improvement in local and general conditions continued. On her return in the fall treatment was resumed and continued until January, 1906. The abdominal glands cannot now be felt, and all the others have either disappeared or are represented by small hard knots.

Case No. 300. R. L., a girl of ten, referred in June, 1905, by Dr. P. V. Carlin. A few moderately large glands on the right side of the neck, and several quite large ones on the left side, one of them being larger than a pigeon's egg. She received thirty-seven exposures, with the result that practically

nothing can be found on the right side, those on the left side greatly diminished in size, the largest one being but one-fourth as large as at the beginning of treatment.

Case No. 301. W. J. C., male, aged thirty. Referred in June, 1905, by Dr. Alexander, of Castle Rock, Colo. Several diseased glands on right side of neck, one of which seems about to suppurate, if the process has not already begun. After a couple of weeks it was evident that there was pus in this gland, so it was opened and drained. After the twenty-first treatment my records state that no glands can be felt.

Case No. 285. W. T. F., male, aged thirty-two. Referred by a grateful patient. Four or five glands, the largest being of the size of a pigeon's egg, on right side of the neck. They are tender to touch, and feel sore. He received seventeen exposures, with the result that the soreness and tenderness had gone from all but one gland, which showed evidence of having suppurated, so he was referred to a surgeon of some prominence, for incision. He did not return for treatment, though I had asked the surgeon to send him back after draining the gland. I learned after a time that the surgeon told him he was throwing money away in taking x-ray treatment and had him discontinue. Some time after this in response to a letter from my attorney the patient called on me, paid up, and acknowledged the plainly apparent improvement, also stating that he would after a time resume the treatment.

Case No. 333 was that of a physician, seriously affected with pulmonary tuberculosis, and having a chain of diseased glands on each side of the neck; enough exposures had been given to relieve him of the pain in the neck and to decrease somewhat the size of the glands, but his general condition became so bad that he was compelled to remain in bed for a time. Since then I have no knowledge of his case.

Case No. 344. Miss K. P., aged thirty-four. Referred by Dr. G. M. Black. A number of glands from one-fourth inch to three-fourths inch in diameter on left side of neck. Another just above clavicle. A few in the left leg near the ankle, and there are some in a corresponding position in the right leg. This patient was very thin, and in poor general condition. After thirty-nine exposures many of the enlarged glands had disappeared and of the others there remained but the cicatrices. Her weight was 120 pounds, the most she had ever weighed. Nearly six months have elapsed since I dismissed her and her improvement locally and generally is maintained.

Several other patients are receiving the Roentgen ray for glandular tuberculosis, and are improving in a perfectly satisfactory manner, but as they are still under treatment, I shall not speak of them.

EXPERIENCES WITH ELECTRIC LIGHT IN THE TREATMENT OF VARIOUS DISEASES.*

BY H. FINKELPEARL, M. D., PH. G., PITTSBURG, PA.

In the treatment of most diseases, the prime objects are to eliminate or destroy the toxic matter causing the pathologic conditions, and to fortify the tissues against invasion of, and susceptibility to, fresh factors of disease.

Elimination is the most ancient method of freeing the body of morbid matter, and the sudorific glands have, from time immemorial, been frequently called upon to perform this work. Of all the physical agents used for this purpose, electric light is the remedy *par excellence*.

That electric light is destructive to bacteria has been proven by experiments made by able investigators, among whom may be found the names of D'Arsonval, Koch, Geissler, Esmarch, Strebel, Richardson, and those of other noted scientists. The deductions of their experiments were that light destroys bacteria in two ways: First, directly, by acting on the plasma of the bacteria themselves. Second, indirectly, by injuring the nutritive basis.

That light is a good remedy to fortify the organism against invasions of bacteria is proven by the work of Kondratiew and others. They hold that by its direct effect on the blood and blood-vessels, and by its stimulating effect on the nervous system which reacts on all vital functions, metabolism is improved and consequently resistance of the body to micro-organisms made greater.

The following cases were treated by light:

Case 1.—A. J., male, age forty, merchant. Patient had been afflicted with albuminuria for over four years. Examining his urine on his first visit to my office, I found that besides albumen his urine contained also a large quantity of sugar. As he was never told of the existence of sugar in his urine, he had been living on a diet usually followed in albuminuria. Now that we had two diseases in which the most important articles of nourishment are forbidden, there were very few articles left to select for the patient's diet. He was therefore

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put on gluten bread and green vegetables with the addition of fish every other day. He was also given an incandescent cabinet bath for from 12 to 20 minutes every third day. The cabinet contained thirty 36-candle power lamps and one arc lamp of 15 amperes. As the patient was corpulent, had a weak heart, and was warned against Turkish or Russian bath, he was at first persuaded with difficulty to try the electric cabinet. He was surprised to find that although he perspired freely, losing from 1 to 1 1-2 pounds after each bath, he felt very little exhaustion, which he feared. The albumen decreased after the first bath, and was reduced to only a trace after the third. He received all told six electric light baths, sometimes every third and sometimes every sixth day. I observed that when he took the electric light bath every third day, the quantity of the albumen in the urine was reduced to only a trace, and when the interval was lengthened, the quantity of albumen increased. The bath seemed to exert no influence on the quantity of sugar present. Patient left for Cambridge Springs, and has not returned at the time of this writing.

Case 2.—Male, age forty, foreman. Has been suffering from obstructive jaundice for over two years. For three months prior to his first visit to my office he had been unable to attend to his work on account of the severe itching, which always came on about 6 P. M. and so distressed him that he was unable to sleep. After treating him for three weeks with the usual drugs, without giving him any relief, I began the administration of incandescent cabinet baths every second or third day. He reported after the first electric bath, that he felt much better and that he slept well, especially the night after taking the bath. After eight incandescent light baths his general condition was very much improved. The itching was absent or slight, sleep good and appetite improved. The color of the skin and urine was a little lighter. As he felt stronger, he returned to his usual work. He was sent out of the city by his employer and I have not heard of him since.

Case 3.—M. S., male, age seventy-four, retired merchant. Had an affection of the skin diagnosed by a Pittsburg dermatologist as psoriasis, and by a prominent New York dermatologist as lichen ruber. I at first suggested to him x-ray, but he would not consent to it. As the medicinal treatment of both dermatologists gave him no relief, I succeeded in

persuading him to try arc light. I put him into the arc cabinet, which is constructed similar to that operated by Dr. Cleaves and described in her work on "Light Energy," with the exception that the lamps are so placed that the patient is seated between the two. Within two or three minutes after this patient entered the cabinet he began to cough, and as he kept that up incessantly for a few minutes, I advised him to leave the cabinet. The cough, however, did not subside. I sent him home with instructions that if he was not relieved from his cough after resting at home for a short time, to advise me, which he did. When I saw him two hours after the arc bath, the cough was very distressing. He was expectorating a fluid consisting of about 75 per cent. of a thin frothy mucus mixed with about 25 per cent. of blood. There could be heard moist râles in both lungs. Temperature 101° F., pulse 120, respiration 40. I ordered a capsule containing codeine, quinine, and ammonium carbonate every two or three hours. On the following morning the cough was still incessant, the patient having passed a sleepless night. He looked and felt very much exhausted. The sputum was decidedly bloody. This condition continued for almost forty-eight hours from the time of exposure to the arc light. After which period it began to subside, and within three days from the beginning of the attack he had completely recovered. I will add that there was no chill, stitch, or pain. It is hardly necessary to say that he never again submitted to photo-therapy or anything that emanated from electricity, although he suffered from his skin disease until he died two years later. I report this case on account of this peculiar accident which nearly cost the patient's life and my reputation as a photo-therapeutist, and hope to hear opinions from the members in regard to the cause of this cough. I was so confident that the gases generated within the cabinet were the cause of the whole trouble, that after that I made an opening in the ceiling of the cabinet which permits the patient to protrude his head in the same manner as in nearly all incandescent light cabinets.

Case 4.—C. B., male, age twenty-five, steel-worker. Was infected with syphilis five years ago. Consulted the writer about a brownish macular discoloration of the skin over his chest, to all appearances the remnant of the cutaneous manifestations of syphilis. Patient was given an incandescent

cabinet bath every four days, no external medication was employed. After the eighth radiant bath, the eruption had disappeared entirely.

Case 5.—A. F., male, age thirty, merchant. Had the initial lesion of syphilis four years ago. Consulted the writer about a squamous eruption on the corona glandis. Patient was given seven incandescent cabinet baths of fifteen minutes each, followed by three minutes' arc light thrown on the lesion by a funnel-shaped reflector. It had almost completely disappeared when the patient had to leave the city, after about three weeks' treatment.

Case 6.—Mrs. L. K., age twenty-two, housewife. Father died at forty, cause unknown to the patient. Mother died at thirty-five in confinement. Patient had been coughing over six months prior to her first visit to the writer's office. Sputum showed tubercle bacilli in every specimen examined. In addition to the usual medicinal treatment, I applied the glass vacuum electrode over both sides of the chest affected for a period of four weeks. Seeing no improvement I decided to try arc light. Patient was then given fifteen minutes' arc light every three days. After ten treatments there was no change for better or worse in the character of the sputum, cough, or weight of the patient. She evidently became discouraged and discontinued her visits to the office. This was a case of advanced pulmonary tuberculosis, and while there was no improvement, the patient held her own while under treatment.

Case 7.—Mill worker, aged twenty-five. Had been afflicted with scabies for several months. The lesions covered almost the entire body, and itching was extremely severe. As the patient had lost all confidence in salves and lotions, I decided to put him on incandescent light treatment at once. He reported on the day after the first incandescent bath, that the itching began to subside soon after he left the cabinet, and that it was the first restful night he had enjoyed for a long time. I ordered him to bring a complete suit of new underwear to prevent reinfection, and put him into the incandescent cabinet for twenty minutes. The itching ceased completely after the second exposure, and the skin cleared in a few days without any medication.

I later treated two other cases of scabies in the same manner with the same good results.

Case 8.—D. M., age thirty-five, bookkeeper. Was suffering from neurasthenia, which was brought on by overwork. As patient was tired of drugging and dieting, I suggested arc light bath on rising. The patient living not far from my office, I advised him to come immediately after rising. He was given an arc bath over the trunk for 10 to 15 minutes, followed by cold sponging. The improvement was remarkably rapid. His sleep became more restful, and he felt more refreshed in the morning. The gastro-intestinal derangements usually accompanying neurasthenia were much relieved. The patient admitted that he never felt so braced up and invigorated as he does after this method of treatment. At the time of this writing he has received fifteen exposures, at first every morning and then every other. He is still under treatment.

In treating three cases of syphilitic buboes I observed an interesting phenomenon, that when I applied arc light directly to the seat of trouble pain and swelling were increased, and as soon as the local application was substituted by a general incandescent cabinet, pain was immediately relieved and the glands melted away in a few days. One of them was on the point of suppuration.

I will not undertake to determine the amount of benefit derived by my cases from the chemical rays, and the amount derived from the thermal rays, but I will say that aside from the chemical rays which electric light baths contain, the advantages of radiant baths over Turkish or Russian are numerous. I will mention a few which are sufficient argument in favor of the former:

First. Radiant heat is more penetrating and consequently drains the deeper tissues much better than any other form of heat.

Second. Patients who cannot stand a high temperature will perspire at a much lower temperature when electric light is the source of heat.

Third. Patients will tolerate a higher degree and a longer exposure to radiant heat than to any other form.

Fourth. That it may be given with impunity to people having a weak heart, if the patient is watched.

Fifth. As the head does not have to be included various substances may be vaporized within the cabinet, and caused to be absorbed by the open pores, avoiding the liability of irritating the respiratory organs.

Discussion.

Dr. William G. Schauffler, New Jersey: I would like to inquire if the doctor can use the incandescent light and the arc light in his method of treatment without injury to the eyes;

whether it is necessary to use colored glasses for the eyes, and whether the plain white light will do any harm. I should also like to ask whether the arc light produces dermatitis.

Dr. F. Barrett, Westbrook, Me.: I have treated one case of diabetic neuritis with the electric light. As the percentage of sugar was very great I decided to try the blue light which has given much better results. She had been free from pain and there had been no sugar in the urine, for eight months before she died of organic disease of the heart.

In some instances of wounds of the fingers I have used a 32-candle power blue light for ten minutes and dressed the wound as in ordinary cases. I found that they healed much more readily than the cases in which I did not take the precaution of using the blue light.

Dr. Thomas W. Brockbank, Philadelphia: I am reminded of having observed the obtunding effect of the blue light in two cases in which I was not looking for it. The first case was an incised wound of the arm two inches long. I cleaned the wound up and while preparing my dressings, hoping to get a still further germicidal effect, I subjected the arm to a 32-candle power blue light. When I passed the sutures the man made no outcry at all. After tying the sutures I again exposed the line to the light and it seemed to have what might be called a sealing effect and I secured the most beautiful primary union. I mention the case to bring out the fact of the anesthetic effect of the light.

The second case was that of a small fatty tumor in the breast of a woman who had a decided objection to taking a general anesthetic. While there was not absolute freedom from pain with the blue light, there was very little discomfort upon the removal of the tumor. I think, therefore, that there is a valuable field particularly for the blue light along the lines of minor surgical work. Some claim that they can get general anesthesia by merely covering the face of the patient with a thick blue veil and allowing the white incandescent light to be suspended over the eyes. Where such an effect is produced it is probably by suggestion.

Dr. William G. Schaufler, New Jersey: I have found nothing in the treatment of poisoning from poison ivy that approaches in value the exposure to the strong blue light. I let my patients take the small lamps to their homes and use the blue light on the affected parts of their bodies for ten or fifteen minutes at a time, repeating the treatment frequently. I have also found that the blue light has a beneficial effect in the insomnia of neurasthenia.

Dr. Thomas W. Brockbank, Philadelphia: I have had experience in one case of ivy poison with the electric light which was cured in a single treatment. The case was brought to me at the first outbreak of symptoms and I exposed the face

and upper part of the neck to a 32-candle power blue light, allowing it to shine directly upon the face and anterior surface of the neck for fifteen minutes. I was much surprised that in twenty-four hours there was an absolute cure, leaving not the slightest vestige to show there had been poison. I think the field is one in which investigation will bring forth very good results.

Dr. Gustavus Werber, Washington, D. C. : Regarding the construction of a lamp,—I have met a gentleman in Washington who claims to be the inventor of the leucodescent lamp, and who claims that the lamp to have the best effect should have its rays out of parallel. I have seen other lamps in which the rays are in parallel. It is claimed for the lamp with the rays out of parallel that there are in its construction a number of corrugators which reflect the light from either side. I should like to ask those experienced in the use of lamps giving the rays in parallel and those out of parallel what the difference has been.

Dr. Morris Weil Brinkmann : According to physical law all radiant matter moves directly from its point of origin with equal tension. If you will look on the drawing on the left you will see that no account is taken of the rays that proceed. In this drawing we must see that there are rays passing in all directions of equal power and spectroscopic qualities. The only possible thing is for each one of the rays to obey the physical law. There would be a certain amount of reflection but the majority of the rays would come from the filaments direct and would be in parallel lines. A true focus would be difficult, if not impossible, to secure. These statements concerning the rays, according to mathematical principles, are only relative every one of them, on account of the character of the reflecting surfaces.

Dr. A. C. Geyser : I have asked Mr. Marshall to explain the question of the rays from the lamps from the manufacturer's point of view.

Dr. J. D. Gibson, Denver : I think if there is any one thing demonstrated concerning the high-frequency currents it is the effect upon sugar. I have had the opportunity to observe the constant lessening of sugar in the urine under the high-frequency current, in which treatment the diet was almost neglected. In my own work I restrict my patients' diet very little unless there is an excessive amount of sugar. I believe the elimination of sugar is one of the most valuable functions of high frequency.

I employ the current about three times a week, as a rule, and follow the same method in diabetic cases.

Dr. Brinkmann : Many men have different ideas as to the true character of the high-frequency current. I believe the modern conception is that unless we have a condenser and a

shunt we do not get a high-frequency current in its true sense. Frequencies below 30,000 and 40,000 are not true frequencies. The high-frequency currents as D'Arsonval first described them are different from the vibratory effects given by the static machine. I think we ought to be careful to have no misconception as to the effect we are getting in certain things. It is questionable, I think, whether the effects that Dr. Gibson has spoken of are effects of the high-frequency current or are not due to some other influence.

Dr. J. D. Gibson: Dr. Apostoli used the induction couch and the cage, but most of my work has been done upon the static machine.

Mr. Marshall of Chicago: There have been some drawings made on the blackboard showing two different styles of construction of therapeutic lamps—one, a parabolic reflector, and the other, the Leucodescent type. It has been claimed that the former would throw parallel rays. I have been requested to demonstrate both styles of lamps:

You will observe that the lamp on the blackboard showing a parabolic reflector, similar to the one I have in my hand, is made to show that the rays projected from the hood are parallel. If the rays are parallel for any distance, they should be parallel throughout their entire length. As a matter of fact, this lamp concentrates the rays into a focus at a point about six inches in front of the mouth of the hood. The rays must then necessarily diverge beyond that point.

By projecting the rays from this lamp against this large sheet of blotting paper, we find that when held at a distance of about six inches, we get a focus; by removing the lamp a greater distance, we find that there is a dark shadow in the center of the rays reflected on the paper; or, when the rays are projected against the ceiling, at a greater distance, we find that there is a dark shadow of about thirty inches in diameter directly in the center. It will thus be seen that in the center we get nothing whatever.

With a parabola of proper construction with the light at the proper point, which is, however, impossible on account of the size of the globe and length of filament, it would be possible for us to get parallel rays. While it is a very easy thing to draw straight lines on the blackboard showing the direction of the rays reflected from the parabolic hood, it is altogether a different thing to get the rays of light to follow the lines that are drawn, as we have seen from this demonstration.

The Leucodescent Therapeutic Lamp is of a different type. The drawing on the blackboard is somewhat inaccurate, as it does not show the correct mathematical proportions and construction that we have in the lamp. Our entire effort in the construction of the Leucodescent has been to get diffusion. Concentration of light is destructive to normal tissue cells—

diffusion is constructive. The parabolic type of lamp was designed by our company with but one object in view—that to secure the greatest possible amount of thermic energy with the least amperage and candle power. The lamp, however, utilizes an insufficient current strength to generate a quality of spectrum that will have therapeutic efficiency if it is shorn of its thermic energy.

The Leucodescent Lamp, which I have in my hand, utilizes 4 1-2 amperes of current and is of 200-candle power. The 500-candle power Leucodescent, which we strongly recommend the use of, utilizes 12 amperes of current. The amperage is important. No manner or character of reflecting surface will improve the quality of the light. The quality can only be improved by utilizing a greater force or energy—a greater amperage. This increased amperage through a single filament heats it to an extremely high point of incandescence, causing it to throw off a quality of light that is brilliantly white. The whiter the light, simply means there is more of the blue and luminous frequencies and less of the red end in its composition, more of the light rays that go to make up increased therapeutic efficiency. It will be observed from the projection of the rays of this lamp on the ceiling that the reflecting surface causes the rays to be thrown broadly out of parallel, which increases their power to penetrate into the deeper structures.

Our company has invested a large amount of money and a great deal of effort, extending over several years, to ascertain the physiological action, clinical application, and operative technique and energy of different types of incandescent therapeutic lamps. It is for this reason that I am particularly gratified to have the opportunity of placing the facts in this matter clearly before you.

I thank you very much for your interest and attention.

Dr. Finkelpearl (closes): In treating the face I am in the habit of using a pair of blue glasses on the patient. I have never yet encountered a case of dermatitis. This is probably because I never expose my patients to extreme heat, and when I desire to put the light very close, I pass my hand over the part to intercept some of the heat.

I have observed the sealing effect of the light, particularly of the arc light.

I have no experience with the blue light in insomnia, but I know that the white light will have the opposite effect. I should therefore judge that the blue light might have the hypnotic effect.

In regard to the rays of the different lamps, I think that question has been well answered by Dr. Brinkmann and the other gentleman who spoke.

THE ABSORPTION OF INFLAMMATORY EXUDATES.*

BY CHARLES WILLIAM STROBELL, M. D., RUTLAND, VT.

I shall confine my remarks to early post-inflammatory effusions into serous cavities, and, to post-operative peritoneal exudates.

The viscera of the various cavities of the body, cranial, spinal, thoracic, abdominal, and pelvic, as also muscle tendons and nerves, are enveloped in shut sacs, containing normally, serous fluid sufficient for purposes of lubrication. The articular cavities are also lined with a serous membrane, providing a similar lubricating fluid for the joint.

In acute or chronic primary or secondary inflammation of any of these serous sacs, an excess exudate occurs. In acute or chronic inflammatory disease of any of the organs, covered by serous sacs, these sacs may become involved with the same result—an excess serous exudate.

Post-operative organized exudates are the result of trauma, in the course of surgical procedures, or, they result from post-operative sepsis.

Post-acute inflammatory effusions, and post-operative exudates, organized or unorganized, infected or sterile, play a most conspicuous rôle in the tragedy of disease, and are the most important factors in the production of chronic pathology.

Termination of acute disease by crisis favors rapid resorption of inflammatory products; termination by lysis favors chronicity and organization of these products.

Nature, in many of the cases of acute primary disease, is entirely adequate to the task of resorption of her serous effusions, but, on the other hand, as often conspicuously fails. And, since a successful outcome of the unaided efforts of Nature to remove the exudate cannot be foretold, it is well to assume that she cannot, and to proceed upon that assumption. As to the indications, a drop in temperature to practically normal, in acute inflammatory disease, is Nature's signal to the absorbents, to begin their work; and it should be equally the signal to us as physicians, to assist.

* Read by title at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Philadelphia, September 20, 1906.

Reviewing these well-established facts, we are again strongly impressed with the urgent need of early effort to avert further complications.

Considering, now, the means at our disposal, of stimulating and inducing speedy resorption, there is this to be said,—bleeding, blistering, and burning are out of date, although I make my humble obeisance to these old-time horrors, now silently stealing away. Think of the “oceans” of cruelty perpetrated by these methods, in the name of medicine. Yet “they had to be,” in the evolution of the healing art. Results undoubtedly were obtained, and, “we did not know any better,” but now, in the light of twentieth-century therapeutics, they are being rapidly displaced, by more humane, yet more effective methods, chief among which is the new physical and mechanical therapy, as typified in the various electric modalities, Roentgen rays, mechanical vibration, and light.

I will not take up the time by a recital of cases, but will simply sum up what has been found of value, to me, in this particular line of investigation.

Meningitis being rarely a primary condition, pressure symptoms, in the course of an acute attack, in any of its forms, calls for lumbar puncture (tentatively). If the acute stage is survived, to promote absorption, mercury, in the form of the peptonate, or, the albuminate, hypodermically;—potassium iodide, to limit of toleration;—Bier’s hyperemia (the rubber band encircling the neck with sufficient pressure to cause a slight facial cyanosis); Roentgen rays; mechanical stimulation of the accessible large lymphatic clusters, and chains; light baths; and moderate purgation.

Pleuritis, whether primary, acute, or as a complication; and, whether the termination is by crisis or by lysis, as soon as circulatory disturbances are controlled, and the patient is safely convalescent, direct electrification of the pneumogastrics, vibratory stimulation, x-rays, light and hot air baths, should be employed, together with potassium iodide and mercury, either singly or in combination. Aperient mineral waters, in sufficient quantity to maintain a moderate catharsis, are also indicated. In pleuritic effusions of children, the daily exposure of the chest to the influence of x-rays, together with the simultaneous administration of fractional doses of the mild chloride

of mercury, will resolve a recent effusion with both rapidity and safety.

Pericardial effusions should receive the same treatment as outlined for the pleural condition, with the addition of paracentesis for pressure symptoms, which in this case would make instant relief by this means imperative, while in the case of the pleural effusion, the pressure is usually well borne, until relief by other than surgical measures is had.

Peritoneal effusion, from primary acute, or secondary peritoneal involvement, calls for the hot air apparatus; light bath; high amperage, high candle power lamp; rectal high-frequency vacuum tubes; Roentgen rays; free purgation, and the liberal use of mercurials and iodides.

In hospitals, *post-operative raying* of all abdominal and pelvic cases, by the different light modalities, together with the administration of alteratives, should be begun, other things being equal, by the end of the first week, to anticipate, and to prevent the formation and organization of peritoneal exudates.

Gynecological cases, whether operated by the supra or infra pubic route, should receive at the earliest practical moment, vaginal or rectal, high-frequency vacuum tube treatments, each séance to continue for fifteen minutes. In addition the usual alteratives and saline laxatives should be judiciously employed.

Effusions into the synovial sheaths of tendons, or into the joint cavities, require the direct current, and radiant energy, in its various forms; vibration; hot air; Bier's hyperemia or induced hot blood stasis; saline aperients, iodides, and mercurials. In cases of gonorrheal origin, these means will not be effectual without the simultaneous use of the salicylates, and, the local application of appropriate silver salts, to the uncured disease in the deep urethra.

I have had occasion to mention Bier's hyperemia, and think it pertinent to say in this connection, that chronic inflammation seems to me to be Nature's own hyperemia, which, when indicated, she institutes for her own protection; but during which resolution cannot occur, necessitating temporarily, a secondary, artificially induced hyperemia, to remove the original and natural one. I might go farther, and say, that all acute diseases of the animal kingdom are natural hyperemic

processes, set in motion to expel pathogenic germs, systemic ptomaines, and foreign substances.

And this is precisely the manner in which our remedies act, thus unconsciously imitating Nature; that is, by inducing an artificial hyperemia. The x-ray has a specific effect in this way;—mechanical stimulatory vibration acts in the same manner;—high-frequency, from coil or static, the same;—as also light and heat. But the master stroke of all, wherever applicable, is to induce this hyperemia on a grand scale, by damming, or obstructing the venous return tide, to that degree, wherein the temperature of the objective part, below the dam, is raised some degrees above the normal,—the “hot damming” of Bier, by the use of rubber bands, and dry cups.

With reference to the use of high-frequency vacuum tubes, I would draw special attention to the great value of the vaginal and rectal modalities, in their power to produce a more or *less* extensive and persistent pelvic and abdominal hyperemia. When either of these tubes is employed for a period of from ten to fifteen minutes, a decided sensation of warmth is experienced by the patient, at the close of the séance, which is not alone confined to the pelvis, but affects the abdominal and thoracic viscera, in many instances, as well; the phenomenon usually persisting for from *one* to two hours, with entire relief of all pain and discomfort. We thus have a means of inducing effective pelvic hyperemia, by an absolutely painless method,—a most important and effective electro-therapeutic contribution to gynecology. There is nothing to compare with it in safety, painlessness of application, and effectiveness, in chronic pelvic disease.

Of high-frequency spark discharges I have little to say, except that in articular effusions, they may be employed with greatly added benefit.

The high-power, high-amperage incandescent lamp is yet upon trial. Undoubtedly the output of blue-violet rays is large in proportion to the amperage, for which reason nothing less than the 500 c. p. lamp, carrying 11 1-2 amperes of current, should be used, except for insolation. It is still “up to” the manufacturers, however, to prove that the desirable ultra-violet rays penetrate the glass globe of the lamp. It is stated upon scientific authority that glass deflects these rays, although

I am unable at this time to refer to the particular authority. If this statement is correct the chemical and germicidal effects of these rays are lost to us, and the only effect of this modality of radiant energy is insolation hyperemia, which, however, is valuable in itself, but which, also, could be obtained in less expensive ways.

Iodide of potassium is used by me in saturated solution, to the limit of tolerance; and in this connection, it may be well to remind ourselves, that the secret of successful administration of massive doses of this drug is to give it very largely diluted, and always upon an empty stomach. In case of an especially sensitive stomach, I resort to the hypodermic use of mercury, in the form of the peptonate, or the albuminate, injected deeply into the muscle, preceded by morphine. The peptonate and albuminate are best prepared after the Bamberger method. Barthelow prefers the simple solution of corrosive sublimate.

23 $\frac{1}{4}$ Merchants' Row.



THE TREATMENT OF HEMORRHOIDS WITH THE CONSTANT CURRENT AND A NEW ELECTRODE.

BY FRANKLIN PATTERSON, M. D., SIOUX FALLS, S. D.

The numerous inquiries which have appeared in the journals from time to time from physicians who desire more information regarding the experience of men using electricity in their practice has not, in my estimation, been met with sufficient attention by those who are in a position to supply this information.

There is probably no one condition in which the effect brought about by this valuable therapeutic agent is as satisfactory both to the physician and patient, as hemorrhoids. The application of the constant current has in my own and in the hands of other men been attended with most happy results, not only in removing the hemorrhoids but in restoring the diseased mucous membrane to a normal condition and in overcoming the accompanying constipation.

In those cases where the pile tumors are indurated much

time may be gained by inserting a platinum needle, connected with the negative pole, into each tumor and using just enough current to blanch the mass. This method will be found to have all the advantages and none of the disadvantages of injection with carbolic acid, ergot, and so forth. And if followed by the anodal application of a covered copper electrode in the rectum with from 10 to 15 ma. every other day, the ultimate result will be all that could be asked and superior to that attained by any other means, be it knife, cautery or what not.

To overcome some of the objections attended with the use of a solid copper electrode I was led to devise a hollow rectal electrode, and I believe that the special features pertaining to



Dr. Patterson's Hollow Rectal Electrode.

this electrode which allow of an improvement in the technique of the treatment of rectal troubles will appeal to those physicians who use this modality in their practice and will make the work easier and more satisfactory to those just beginning or who are considering its adoption.

As is well known, the desiccating properties of the positive pole require that a covering be used on oxidizable metal electrodes to prevent their sticking to the mucous membrane, and of sufficient thickness to be capable of holding considerable moisture to facilitate the free flow of the current with a minimum of resistance. Now, as the success of the treatment depends, not alone upon the current but also on the penetration of the immediate surrounding tissues with the oxychloride of copper set free by the action of electricity upon this metal, it will be plain that the electrode covering must become saturated with this salt, necessitating the use of the same covering several times, before it becomes efficacious. The use of chamois skin or other material which cannot be replaced by a fresh piece, or at least rendered aseptic for each individual treatment, is not in accord with the present day teaching of cleanliness.

In my new electrode the copper bulb is unscrewed from the shank and the chamber loosely filled with absorbent cotton and the bulb replaced. The electrode is then dipped into water or medicated solution and the rubber tip squeezed several times to thoroughly wet the cotton. A covering of gold-beaters' skin or other thin material is placed over the copper bulb, lubricated, and inserted in the rectum and the current turned on. The thin covering offers little or no resistance to the passage of the copper salts and is kept moist throughout the treatment by the wet cotton in the chamber. I have selected the following case from among many as best showing the effect of this treatment in a long-standing case of hemorrhoids with prolapsus and constipation.

Male, aged forty, shoemaker, unmarried, had been troubled with constipation and piles for several years. At the time patient presented himself in September, 1904, he had made arrangements to go to the hospital for operation the following day, upon the advice of another physician. Examination showed a prolapsus of the gut with several hemorrhoids which reminded me of a fair-sized doughnut. I replaced the gut, which the other physician had failed to do and which undoubtedly decided the patient in my favor, and directed him to report the following day for treatment, assuring him of a complete recovery without resorting to operation. This man received treatment every other day for three weeks with from 10 to 15 ma. + pole. The first few applications were attended with some slight burning pain lasting for about half an hour, but the latter part of the treatment was practically free from any pain whatever, and the case was discharged cured. Not only has the patient been perfectly free from rectal trouble but the constipation was relieved permanently.



Editorial.

THE RELATION OF INDUCED HYPEREMIA TO THERAPEUTICS.

THE danger attending an innovation in therapeutics is that the votaries of a new method are apt to go to extremes in their endeavor to make it applicable to every pathological condition. So the hydropath, the osteopath, the neuropath, and various other cults, past and present, who have undertaken to establish methods of treatment, which have been undoubtedly adapted to wide therapeutic ranges, have employed them for the cure of disease, without reference to the use of other measures better adapted in many cases to the treatment of the conditions in question.

The advocates of the employment of hyperemia, in the treatment of inflammatory conditions, have undertaken to establish a general law for its indication based upon the fact that normal physiological processes are associated with hyperemia.

The employment of heat, in various ways—sinapisms, dry and wet cupping, blisters, and massage, all of which induce various degrees of local hyperemia—is as old as the practice of medicine, but we are now persuaded by one advocate and his followers that the use of hyperemia in therapeutics is a new thing, and that now it shall be called "Bier's hyperemia." The result, however, of calling attention to the value and importance of hyperemia in treatment, while not belonging to any one individual, will undoubtedly make more constant and rational the methods of employing procedures so valuable by the profession at large, and a decided gain to humanity will result as has been the case with the exploiting, a generation ago, of hydrotherapy and osteopathy to-day. Hydrotherapy in its field of application for the administration of heat and cold; and the principles of spinal stimulation and inhibition as rationally employed by the up-to-date practitioner, in the application of mechanical vibration, hold valuable places which are undoubtedly due to the energy with which the monotherapists who advocated them have brought them to recognition.

The effects of the induction of local hyperemia are at least fourfold:

(1) Where septic processes are present, the larger influx of blood brings more phagocytes to the region of infection where in the lymph spaces the germs are destroyed. When induced by the administration of radiant heat and light, there is a coincident local inhibition to the activity of the infectious element present—"opsonic" as it were.

(2) The induction of general hyperemia, by increase in the vascularity of the skin, which is capable of holding two-thirds of the blood of the whole body, produces a derivative effect, assisting to call away the blood from regions of passive hyperemia, and lessen the internal congestion.

(3) The same general hyperemia in cases of arterio-sclerosis and its numerous allied conditions removes peripheral tension, by dilatation of the superficial arterioles and capillaries thereby relieving the heart, and at the same time inducing more active metabolism.

(4) The induction of extreme local hyperemia in conditions of early congestion before "obnoxious stasis," with exudations, are established, will serve a valuable purpose in the relief of traumatic inflammations, but to use it after the process is once established will but palliate the suffering; failing entirely to relieve the local condition. The same is true of the exudations which follow septic inflammations.

In the affections to which hyperemia is adapted its use is invaluable, but the methods of its induction for local effects are manifold greater, and by far more valuable than the recent votaries have dreamed of. Cupping, cording, and the employment of dry hot air are the methods which they especially advocate. Far better in selected cases is the employment of high-frequency currents from large ampere sources, or the use of radiant light and heat energy by both local and general methods of application.

The employment of high-frequency currents, in septic pelvic conditions and for the relief of inflammatory processes, such as pleurisy and pericarditis combined with the application of radiant light and heat over the trunk with the induction of active hyperemia, produce results not recognized by Bier.

In the relief of local congestions with exudation and infiltra-

tion, in the early stage or when fully organized, the induction of local hyperemia alone is devoid of results, as a host of physicians who have used hot air apparatus will affirm. We must resort to more energetic measures, in the treatment of early traumatic conditions, employing agents which locally lessen hyperemia, instead of increasing it. For the relief of a local sprain or in the treatment of dysmenorrhea or prostatitis hyperemia alone will not meet the requirements. Neither will the induction of hyperemia increase local cellular activity, as will the local contractions produced by the static current, or local vibration and tissue stimulation of the scientifically applied massage and mechanical vibration. Nor will it relieve the regions of spinal tenderness associated with peripheral lesions, as will the thorough and scientific application of the principles of inhibition and stimulation as employed with the mechanical vibrator to these regions of tenderness.

The broad-gauge therapist thinks of something else besides the use of his own name and fame with reference to therapeutic measures, and while vaunting them, recognizes other valuable therapeutic procedure.

* * *

A NEW ASSOCIATION OF PHYSIO-THERAPEUTICS.

WE are notified that a new Association to be known as the American Physio-Therapeutic Association has been organized, or is about to be organized, with the following officers: President, Dr. H. H. Roberts of Lexington, Ky.; Secretary, Dr. Otto Juettner, Cincinnati, Ohio; Treasurer, Dr. Geo. H. Grant, Richmond, Ind.; Executive Council, Drs. W. F. Klein, Lebanon, Pa.; James Hanks, Brashear, Mo.; J. W. Unger, West Point, Miss.; Chas. S. Northern, Talladega, Ala.; R. W. Gibbs, Columbia, S. C.; S. J. Crumbine, Topeka, Kas.; F. L. Keeler, Perry, Okla.

This movement for the formation of a new National Physical-Therapeutic Association which is not to be local in character, but as its name and membership imply, seeks to include the whole Middle-West and East, is a movement the object of which is hard to understand, as the American Electro-

✓ Therapeutic Association, already established, covers the same territory and its membership includes a goodly number who are also members of the older organization. Furthermore the American Electro-Therapeutic Association will hereafter include all of the physical agents in the scope of its field of investigation, as can be easily inferred from the resolution published in Transactions of the last meeting.

A movement was instituted more than two years ago, calling for the organization of branch societies throughout the country to co-operate with the parent body in extending the scope and better knowledge of physical therapeutics. One society, the New England Electro-Therapeutic Association, already includes in its membership ninety members who co-operate with the parent body, and whose members are generally members of that body.

Upon sober after thought we are sure that the larger number of the members who may have enrolled themselves in this new association will appreciate the importance of unity and aid in organizing local societies which can hold frequent meetings throughout the year, and when possible, meet with the parent Association annually. Regularly graduated and registered physicians in ethical practice are eligible to and always welcome to membership in the American Electro-Therapeutic Association.

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AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

SECRETARY'S PAGE.

Fellows: The Executive Council met on Saturday evening, January 26th, with the following members present: Dr. M. W. Brinkmann, President, in the chair, and Drs. Heuel, Snow, and Morse. Represented by proxy, Drs. Rockwell, Dickson, and Bishop.

Since it has become generally known that Boston has been decided upon as the next place of meeting, a spark of enthusiasm has passed through the various manufacturing houses and numerous requests have already been made for available exhibition space.

Dr. Morse, the local chairman, who is noted for his activity, reports progress.

The Executive Council, at the last meeting, decided to issue certificates of merit to all deserving manufacturers that exhibit at future meetings.

On Friday, February the 8th, the New England Electro-Therapeutic Association gave its first annual dinner, to which about one hundred sat down; as usual, Dr. Morse catered especially to the comfort of the ladies. Dr Howe as chairman of the arrangement committee deserves great credit. Your secretary represented the American Electro-Therapeutic Association. After a few remarks Dr. White, member of both Associations, responded for the New England Electro-Therapeutic Association. The Association now numbers about ninety members.

On February 9th the secretary received the following letter:

Philadelphia, Pa.

DEAR DR. GEYSER:

Please send me *one dozen* application blanks for the American Electric-Therapeutic Association, and oblige,

CHARLES BROCKBANK.

The Secretary would like to receive such letters often. There is a prospect of doubling the membership of the Association this year.

The following were favorably considered by the Executive Council for membership at the last meeting of the Council: Dr. William H. Diefenbach, 1748 Broadway, N. Y., by A. C. Geysner; Dr. Charles Rosenthal, 347 Blue Hill, Boston, Mass., by W. W. Eaton; Dr. Giacinto De Sillo, Rome, Italy, by Prof. Carlo Colombo; Dr. Francis H. Munroe, 530 Orange St., Essex, N. J., by M. W. Brinkmann; Dr. David A. McMichael, 5 West 92d St., N. Y., by Wm. Benham Snow.

ALBERT C. GEYSER,

Secretary.

Progress in Physical Therapeutics.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

Illustrating the Penetrating Power of Radium. By Robert Abbey, M. D., Archives of the Roentgen Ray, February, 1907.

To the question "What difference is there between the light from the stars and radium rays?" the writer replies that "radium rays move in absolutely straight lines without deviation by atmosphere, water, lenses, or prisms, and nothing is opaque to them; they would even penetrate that stone column near you, which light does not," he said. He demonstrated this by taking a smooth granite boulder shown in an accompanying illustration, and cutting a strip of lead wire in bits, twisted them into letters which he laid upon thick light-proof envelopes inclosing a photographic plate. On this he laid a board, and on this a stone, and on top of the stone he placed a small glass tube containing a bit of radium about the size of a grain of rice (sixty milligrams pure radium bromide, German).

On developing the plate after three days' exposure, a strong picture of the relatively denser lead was seen, as is still shown in an accompanying skiagraph. He also shows a second illustration of radium penetration in which a heavy rifle was loaded with one cartridge in the barrel and two in the magazines. The same radium was secured by a hatpin twelve inches above the plate on which the rifle was laid, and four days' exposure gave an excellent picture of the bullets through $\frac{3}{4}$ -inch steel, the rifle being one inch in diameter, and the bullet $\frac{1}{4}$. The same demonstration was made by the Roentgen ray, but the writer observes "that it is far more impressive to witness the active energy incessantly given off by the innocent-looking little tube of yellow salt."

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Roentgen Rays in the Treatment of Lupus Vulgaris. H. W. Van Allen, M. D., Jour. A. M. A., February 2, 1907.

In this scientific paper the author goes into the pathology

of this disease so clearly that the article is quoted very liberally as it is well worth the perusal of every x-ray worker. In commencing his pathological descriptions he quotes from Hyde and Montgomery as follows: "The essential lesion in all forms of cutaneous tuberculosis is the nodule of granulation tissue containing small, round cells, larger epithelioid cells, and giant cells, having a homogeneous center, and a few or many large vascular nuclei situated for the most part along the border of the cell. Around and between these cellular elements is woven a network of connective tissue bundles." He calls attention to the fact of marked proliferation of the endothelium of the vessels, but no new vessels are formed, the old ones becoming obliterated while a necrosis or cheesy degeneration of both cells and intercellular substance results. The tubercle bacilli, while not numerous, are always present in their nodule and predisposed to the giant cell. He also points out that in lupus the proliferation of cells leads to a constructive or regenerative process, as a result of which the lupus nodules may be replaced by scar tissue or there may be an excessive formation of new connective tissue, producing the condition of elephantiasis so often seen in lupus. He considers that involution in lupus is accomplished in three ways: first, by reabsorption of tissue; second, fibrous metamorphosis; and third, by ulceration. He cites numerous cases in which he has had made for him microscopic examinations of lupoid tissue after x-ray treatment, with findings similar to those of Heuter, in which the primitive lupus tissue underwent a transformation into fibrous tissue,—only a few tubercle cells remaining. The giant cells were numerous, and were most marked at the margin of the nodule, where they were seen in great masses almost fully displacing the leucocytes which normally surround the tubercle focus. This new connective tissue makes a well-defined limit to the tubercle. No tubercle bacilli could be found in any case after an extended course of x-ray treatment. He quotes Doutreloup's report of a case after ten weeks' treatment, as follows: "The tubercle seems to be surrounded by leucocytes and is replaced almost entirely by connective tissue containing a few lupoid cells, with an occasional giant cell."

The hyperemia set up by the rays provokes an abundant migration of leucocytes from the vessels. This action takes place first at the edge of the tubercle nodule, and penetrates by little projections into the substance of the nodule, being in time changed to fusiform cells and fibrous connective tissue. He points the similarity in the process of cure of nature's own efforts, and also of its being reinforced by x-ray. He calls especial attention to the importance of protecting this new tissue when treating the parts which are still diseased, a point well worthy of special attention when treating lupus, and he

believes in treating these conditions until necrosis follows the treatment, but not treating after necrosis occurs. When this is accomplished we have a healthy scar surface following the healing of the small, non-tuberculous simple ulcer, which heals slowly but is usually permanent. His method is to employ a static machine as the exciter, and a low-tube,—spark-gap of one or two inches, with a distance of the anode from the skin of about ten inches; the treatment lasting about ten minutes. This is repeated about twice a week until a slight hyperemia is produced. The patient is then allowed to rest for a month, when on inspection, a pinkish healthy color is found and nodules can be clearly made out, frequently some that were not visible before. The new tissue should be protected, while the nodules should be treated again with x-ray.

He reports fifteen cases selected for their certainty of diagnosis. He gives a percentage of eighty or eighty-seven per cent. cured, which is a splendid result. The average duration of treatment was six months.

X-ray in Skin Diseases. By Wm. G. Egelhoff, M. D., American Journal of Dermatology.

In this paper the writer shows by accompanying illustrations the results of successful treatment of cases of epithelioma, tubercular glands, eczema, and keloids; results which are in full accord with the experience of all skilled operators. He observes that in cases of lupus vulgaris, watchfulness is essential at the end of treatment with the x-ray, stating that the skin will smooth and heal over, when there will suddenly appear scattered foci which will require immediate attention, but does not state what he does at this stage. He calls particular attention to the importance of the use of the x-ray in the treatment of tubercular glands, and the importance, if they are removed by incision, that the x-ray should be used subsequently to prevent recurrence. In "acne, complicated by seborrhea oleosa, it is a universally known fact that the x-rays will cure the condition in a very short time." In this case the writer considers dermatitis and tanning a necessity. The x-ray treatment is alternated with high frequency.

The Roentgen Ray in the Treatment of Lupus. By Hall Edwards, L. R. C. P., F. R. C. S., Archives of the Roentgen Ray, January, 1907.

The writer has not obtained uniform results by the employment of one method. In some cases of lupus planus which have failed to respond to the x-ray, he has found that after

irritation of the surface, or blistering, they have rapidly improved by reapplying the rays. He calls attention to the fact that excellent results were achieved in two cases of lupus where an accidental erysipelas occurred during the period of reaction produced by the x-ray. In both cases the lupus involved a large area of the face. After recovering from the erysipelas they made such rapid strides that in a few months they were entirely well. He observes that it has been proved that x-rays have no effect upon the tubercle bacilli themselves, and inquires "how do the rays bring about their destruction?" and concludes that it is now generally admitted that while the x-rays produce partial atrophy of the more enlarged elements, such as the sebaceous glands, the hair follicles, the nails, etc., their chief effect is due to vascular disturbance. The smaller vessels are found to be dilated, filled with blood, and surrounded by leucocytes.

He refers to the observations of Dr. Wright in which he seems to have proved that in cases of tubercular infection, the power of the phagocytes to digest bacteria is lowered, and that by stimulating these cells to increased action, the resistance of the tissues is increased, and further states that it has been found that the blood fluid performs a definite and independent rôle in connection with the phagocytes. By the simple expedient of testing separately and in conjunction the serum and the leucocytes it is shown that opsonins exist in the serum, and their function is in some way to alter the microbe so that it may fall an easy prey to the leucocytes, for if the leucocytes are suspended in the serum, from which the opsonins have been removed, they are incapable of manifesting a phagocytic action. He then observes the experiments of Wright and Douglas at length, in the course of which he states that if the x-ray had not direct action in bringing about the destruction of the bacilli they would not cease to exist, and farther inquires, "Is it not possible that the opsonic index of the blood is raised by the action of the rays?" Attention is called to the fact that it has been claimed that raising of the opsonic index, prior to the employment of the x-ray, helps the latter to fulfill its work in a more efficient manner. He reports several cases with illustrations, in all of which excellent results were obtained.

In one case in an elderly woman, he cannot say that much has been added from the use of injections, as equally good results had been obtained in similar cases before their employment, for the purpose of raising the opsonic index. In considering this case he observes that in comparing the results in the treatment of lupus, by the various physical methods at our disposal, he is of opinion that at any rate in England, the use of the x-ray has proved the most useful. The best

method in a large majority of cases is the combination of Finsen and x-ray treatment.

In another case of a youth in which the lesion was very extensive, in which daily five-minute exposures for a fortnight were employed, at the end of three weeks the surface was healed except in two or three small patches on the edges of the lips. Five months later he came again, when the lesion had begun to extend and had encroached towards his forehead. He was again treated and sent home as cured. After a time he again returned, and was again treated, and again to all appearances cured. The last treatment was augmented by small injections of tuberculin, and his opsonic index is at the present time as near as possible normal. The use of the tuberculin, however, had not seemed to hasten the healing process, or alter it in any way. It is to be seen, however, if the effects will be more lasting. He farther states that in looking over his notes of a large number of cases treated with the x-ray, he is pleased to find that in every instance the patient had received great relief, and in a very large number had been cured. He still employs the method of giving small, frequently repeated doses.

He observes that it is frequently found out that x-ray treatment of lupus of the mucous membrane has not yielded satisfactory results, and that the Americans attribute our non-success in this direction to our using high-vacuum tubes only for therapeutic purposes, and latterly in his hands, low-vacuum tubes have given better results. He says, however, that the x-ray alone in the treatment of mucous surfaces is far from satisfactory.

RADIOGRAPHY.

EDITED BY HERMAN GRAD, M. D.

On the Direction of Maximum Intensity for Radiations by a Focus-tube. By Professor H. Bordier, Archives of the Roentgen Ray, February, 1907.

The writer calls attention to the great importance of radiologists, especially those engaged in radiotherapy, as to where, when the rays are projected from the anticathode we shall expect to find the direction of maximum intensity. He observes that it must be situated somewhere at the median plane of the tube which he defines as the plane at right angles with the anticathode which passes through the center of the cathode. In order to demonstrate this, he performed the following experiment. A semicircular gap with a diameter two centimeters

greater than that of the focus-tube, was cut in the side of a wooden board. A row of fresh barium platino-cyanide discs was cemented to the inner edge of this semicircle, the distance between the discs being one centimeter. The focus-tube was put in its plane of symmetry in a vertical direction, and the board was placed in the same plane, and adjusted until the semicircle was concentric with the tube. Under these conditions the surface of any one pastille was normal to the core of rays irradiating it, and all the discs were at an equal distance from the center of the anticathode. The current was then turned on, and the discs irradiated until they exhibited a distinct change of tint. On examination it was found that two of the discs were conspicuously darker than the rest, and that the tint of the others gradually grew lighter towards either end of the arc. Repetitions of the experiment gave each time the same result, which demonstrates "that the quantity of x-rays emitted is not the same over the whole illuminated hemisphere of the x-ray bulb, but that there is one direction in which their intensity is maximum."

He repeated this experiment, placing the platino-cyanide discs nearer together, and he was thus able to determine definitely the position of the cone of rays, which gave the maximum effect. This was done still more accurately by replacing the discs by a continuous strip of sensitized paper, the semicircular gap being lined with a strip of platino-cyanide paper 6 millimeters wide and 20 centimeters long. After 12 minutes the spot in which the brown discoloration was strongest was readily recognized, for the bulb under examination, the center of this zone of maximum intensity, was situated in such a position that a line from it to the center of the anticathode made an angle of 75° to 80° with the central axis of the bulb.

"There is thus one line passing through the center of the anticathode along which the intensity of irradiation is greater than in any other direction. We have called this the *optimum direction of irradiation* for any particular tube."

He farther states that "the existence of this 'optimum' direction of irradiation may be easily proved by inclosing a strip of silver bromide paper in a black envelope and wrapping it around the globe of the focus-tube in the plane of symmetry. After the current has been passed through the tube for a few seconds, the paper may be developed, and it will be seen that it is not of uniform color, the ends being of a light gray, whilst the middle is much darker. A closer examination shows a zone of more intense coloration near the middle, and the tint gradually fading away as we approach the ends." He also calls attention to the fact that the "porte-radiometers" devised by Haret and Belot do not give an exact measure of the rays

absorbed, as they do not correspond to the true "optimum" position. This he shows by comparison of the different positions. He suggests that "a knowledge of the optimum direction of irradiation for a given focus-tube will help us to improve the adjustment of the various localizers and ray-proof screens now in use." The localizers should be placed in such a position that their axis coincides with the "optimum" direction of irradiation, which is not fulfilled in any of the existing localizers. He farther suggests that, as tubes vary in the angle of the "optimum" direction of irradiation, each focus-tube should be carefully marked with the position of its "optimum" direction, which he suggests can be done by etching a small cross on the glass with hydrofluoric acid by the manufacturers. The varying position in each tube depends on the angle between the plane of the anticathode and the principal axis. These observations are certainly of great importance, and call for more than a passing attention.

DIETETICS.

EDITED BY SIGISMUND COHN, M. D.

Dietetic Treatment of Disease. By Thomas Dutton, M. D., M. R. C. P., Archives of the Roentgen Ray, February, 1907.

The writer calls attention to the paucity of instruction in the employment of dietetics in the regular course of the medical colleges, and the great importance of its employment in therapeutics. The writer states that more than twelve years ago he called attention to this shortcoming in the systematic training of dietetics, and adds that even at this time no attention is paid to the subject. He deplors the fact that "since the importance of treatment by diet has been acknowledged by the profession, an army of faddists have arisen, declaring their particular diet a cure for all ills the flesh is heir to." He enumerates the absurd schools and the ridiculous consideration to these fads in lay literature, and protests against this as "dietetic balderdash," but calls attention, however, to the value of serious study of diet and its virtue in the treatment of skin diseases, many cases of indigestion, gout, and rheumatism, "for a fruitarian, antipurin, and purin diet may be advisable to bring about a cure. He places particular emphasis on the following rules, for guidance. "A sound healthy man or woman with a normal digestion may obtain nourishment from any kind of food and need not pick or choose, and the only care they need take is, to see that the food is (a) sound, (b) well-cooked, and note from time to time, (c) any food that they may find by

experience disagrees with them. Under these conditions the physician would have nothing to do with the healthy individual."

Would it not, however, be judicious, to outline plans and habits of diet for the gormandizer—a régime that might save future sickness. In this perhaps, the faddists who are not too extreme may be wisely anticipating the forethought of the family physician, for there is no doubt that the *ad libitum* diet in health leads to a great many processes, such as arteriosclerosis and the train of sequelæ associated with it. It would be better to limit and restrain individuals in health, who are predisposed to these troubles by heredity, from the injudicious use of too stimulating diet, including alcoholic beverages, too often indulged by so-called healthy people.

Preventive medicine should be as much a procedure with the advanced therapist as the employment of dietetic measures, for the patient is found in a state of impaired health almost invariably as the result of overindulgence. [Editor.]

PSYCHO-THERAPY.

EDITED BY LESLIE MEACHAM, M. D.

Some Experience with the Simpler Methods of Psycho-therapy and Re-education. By Lewellys F. Barker, M. D., Professor of Medicine, Johns Hopkins University. The American Journal of Medical Sciences, October, 1906.

Eighty cases were treated in Johns Hopkins Hospital, and reports are made in detail of fourteen in which the simpler methods of isolation, medication, and persuasion were employed. Hypnotism was resorted to only for special purposes. He notes the necessity of care, lest the effects of the physical and medical treatment be attributed to psychic effect, but says that "Those who watched these cases with the same adjuvants, the same environment, and the same merely suggestive influences, but without the conscious application of psycho-therapy in the form of persuasion, isolation, and re-education, are convinced of the striking way in which the results differ when psycho-therapy is consciously and systematically employed." Concerning some of the cases that were but little benefited he notes that a longer trial or the use of the more complex and difficult psycho-therapeutic measures or someone more skilled in the simpler methods might have succeeded.

Use and abuse of psycho-therapy.—Nearly every useful practice has some special danger associated with it, but psycho-therapy need not be tabooed for the reason that some men abuse it or because quacks and charlatans degrade it. Nor dare I fail to teach students in the medical school the use of so strong a weapon because I have the fear that some among them may employ it to its discredit. Educated physicians may regret the excesses of the blindly ignorant and unscrupulously greedy, but they should not themselves err by neglecting a side of medicine which quacks have often shown themselves more capable of exercising. If the physician relies on science, experience, and training, he will surely be protected from the vagaries in psycho-therapy to which those are prone who put their trust in instinct, introspection, or occult revelation. The psycho-therapist should be an honest man and an expert clinician, should recognize the horrible reality of the misery of the psycho-neurotics. He must be interested in functional disturbances and not simply in anatomical lesions, and understand that hysteria and psychasthenia are as much diseases as pneumonia and gonorrhea, and often incapacitate the sufferer for a much longer period of time. He should be skilled in all the modern refinements of diagnosis, and should exhaust them in the study of his case before beginning his therapy. He will decide what troubles are organic, and which are of "nervous" origin. He will explain the nature of his troubles and will tell him which of them he believes to be curable. He will explain to him the relation of his mental states to his symptoms, and secure his co-operation in the cure.

The patients require firm guidance, but they also need judicious sympathy, a fact which it is to be feared too few physicians and scarcely any of the laity understand.

Much time must be given to the patients, their psychic states analyzed and their confidence won by the insight shown into their condition. The neurasthenic is ill and knows that he is. The physician who listens to the tale, who shows by his questions that he is familiar with many of the symptoms from which the patient is suffering, even before he speaks of them, who extends his sympathy to him in his distress, and tells him that he need have no fear, that he believes his disease is curable, and that he will help him to get well, makes the right start. Under existing conditions there is no likelihood of the physic factor in disease being underestimated, or of its claims being underestimated, while there is little doubt that the psychic factor is too often ignored or misunderstood. This is partly due to the entire neglect of the study of psychology as a part of cerebral physiology. It is all wrong that physicians should make no effort to reap the crop of good results which might be obtained by psycho-therapy. Re-education is undoubtedly

one of the most important factors in producing lasting cures. Nothing is easier among psycho-neuropathics than to make some symptoms disappear, but the experienced neurologist will not be duped into thinking that he has made a cure by driving away a symptom. In many cases it is only by influencing slowly the mind and body, by careful re-education, that anything like a real cure can be made.

[This article is an admirable presentation of the principles that the editor of this department has been endeavoring to impress upon the profession in his editorial and professional work, for many years.]

L. R. M.

Mind Cure: Its Service to the Community. Richard C. Cabot, Boston. Read at the annual meeting of the Colorado State Medical Society, October 10, 1906.

Two great services performed by the mind cure movement:

1. Insistence upon certain aspects of the truth about health that have not yet received due attention.
2. Just criticisms of certain medical faults. The three main articles of belief are: (1) People are sick because they think so. (2) People are sick because they do not behave themselves properly. (3) The thought of sickness is itself a pernicious one and should be banished so far as possible from consciousness. Cabot argues that many patients are suffering chiefly from a lack of employment and interest, and that, "More often than not, we should 'speed her up,' teach the patient to live harder, faster, more intensely, or with some better reason for his activities. It is only by enriching their interest that we can make some patients forget their suffering; with others it is only by providing an outlet for their perverted energies that we can prevent internal friction and its protean shapes of misery." He inclines to Dubois's opinion that neurasthenia, and the neuroses of various organs, are essentially mental diseases. Mind cure by Dubois is simply education. It is the teaching of the patient to help himself by self-suggestion. (This has been the editor's method and preaching for many years.)

He criticises the formation of the doctor habit and the treatment of local symptoms in neurasthenic patients and says: "Besides looking for the anatomical basis of supposedly functional disorders we should search for the psychic and functional basis of the suffering in organic diseases. By attention to such matters as this, we shall not cure disease, but we may diminish that which chiefly concerns the patient—her suffering. In all suffering from disease there are two elements, the lesion, and what the patient thinks of it, associates with it, fears and apprehends from it. This latter element should be searched for and

is often the only curable part of the disease. His conclusions are: (1) The mind cure movement has rendered notable public service, because its main ideas are important and in their spirit, if not in their letter, true. (2) The mind cure movement exerts a force of healthy criticism upon the physician's tendency (a) to ignore the possible aggravation of disease by the mental effects of diagnosis and treatment which he uses; (b) to encourage the doctor habit, and (c) to treat neurotic cases either by an attenuated and diluted mental régime, or by "sitting on the safety valve."

Clinical Psychology. Frank Parsons Norbury, A. M., M. D., Jacksonville, Ill. (Address in Medicine, Thirty-Second Annual Meeting Mississippi Valley Medical Association.)

The author advocates the necessity of a knowledge of psychology in medicine not wholly by original research, but accepting all that physiological psychology has proven, and accepting the physical basis of mind, as given in James' law, "No mental modification ever occurs which is not accompanied or followed by a bodily change." The brain itself, the king of our organs, which commands, is a passive organ because the cells upon which its activity depends, do not in themselves, act, but react. Much that is useless has been written about the body and mind because of the lack of recognition of the fact that a change of consciousness never takes place without a change of the nervous system in the brain, and the change in the brain never takes place without a change in consciousness. The only way of knowing consciousness is by studying the acts of one's own mind. Consciousness is composed not only of thoughts and feelings referring to the outer world, but beneath these there is a vast body of other feelings and other thoughts, referring to what is going on in our own organism. It is this knowledge which becomes of clinical value in studying the etiology and clinical nature of hallucinations, and the evolution of delusions.

We know of the interior of other people's consciousness only by inference. Conduct is the criterion of mental unsoundness, but not all, for there is much beside disorder of mind in insanity as there are other nervous and bodily changes to be taken into account. When there is disorder of the mind there is disorder of the nervous processes and of those processes which have a nervous accompaniment. The highest are those which regulate the movements of the body with respect to the circumstances in the outside world; in fact those which actuate conduct. Conduct in its disorder of adjustment is of clinical value in the psychological study of an individual. Further, it is

the product of education, of innate character, of environment, of experience, of fate, of fortune, and of numerous other conditions and must be studied in its relationship to all of these modifying influences each of which has its clinical value. The fundamental elements of insanity are disorders of the emotions and the intellect, and the so-called disorders of the "will" are merely expressions of one or both of the former. In analytical work we note not only positive but negative results. We can frequently determine what disease the patient has by finding out what he has not, making one of the most refined and scientific diagnoses, that by exclusion. Another great field is in the cases classed as neurasthenic and psychasthenic. The remedy for these is in education, plus right environment and living. Good moral education is the surest prophylaxis of nervous exhaustion. These patients are imbued with auto-suggestions and must be led away by the earnest efforts of the thoughtful, resourceful physician. Some physicians have so little knowledge of the mentality of nervous people that they do more harm than good. It is in proper self-education that the sick find a cure and well people a preservation against nervous diseases.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Hydrotherapy in Acute Leptomeningitis.

Dr. Geo. C. Merriman in an editorial in the Monthly Cyclo-pedia of Practical Medicine calls attention to the beneficial influence of the hot full bath upon this most unpromising affection. In addition to medication, dietetics, etc., he pursues systemically the plan laid down by Aufrecht. The editor has found it best to place the patient in a tub at a temperature of 95° F. and add water until the temperature reaches 104° or 105° F. The duration of the bath is 10 to 15 minutes, an ice cap being kept upon the head during its application. The bath-tub should be cushioned with blankets and the patient carefully moved to and fro by means of a sheet. The bath should never be administered in the early morning or late in the evening. Its rationale is to draw the blood from the brain and meninges to the skin; to increase the activity of the latter and the secretions from the sweat glands; to eliminate large quantities of toxins by acting upon the kidneys and produce upon the sensory nerve tracts an anodyne and sedative effect. The editor concurs with Aufrecht and Vorochilsky that the entire course of the disease is rendered mild by these baths.

Lumbar puncture in two personal cases has seemed to help. Personal experience has shown that the hot full bath possesses another feature of no little consideration in the treatment of this disease, and that is the relief of some of the most distressing symptoms that cause great mental anguish to the members of the patient's family.

Dr. Merriman says: "It has been said that the treatment of all cases of meningitis is hopeless, and to save their lives is a crime. I am willing to admit that, in the tubercular form of the disease, our efforts have not been crowned with any very gratifying degree of success, though a limited number of cases have been reported in which the cure was effected and recovery apparently complete."

So far the treatment of acute lept meningitis has been, of necessity, purely symptomatic. There is no disease in which the personal equation of the patient bears so great a part as in this most insidious one.

Begin with an active calomel purgative, combining with it a good, honest dose of Dover's powder. Reduce the temperature with ice water sponges and by the application of ice bags direct to the cervical region, posteriorly. Then inject from 1500 to 5000 units of diphtheria antitoxic serum, varying the dose according to the age of the patient and the degree of the infection. After six hours repeat this dose, and continue to repeat every six hours until there be a remission of the symptoms, or the condition of the patient's heart contraindicates the further use of the serum. When the temperature goes above 103° F., or the other symptoms are alarming I give a hot bath, beginning at about 99° F., and increasing the temperature of the bath to from 104° F. to 106° F. The patient is then wrapped in woolen blankets, without drying, and ice bags applied to the neck, or to neck and spine. If the ice be not applied, the temperature will continue to rise, though the general condition of the patient will be improved. I would say that I have found, in collapse, that the administration of a hot bath without the application of ice has a decidedly beneficial effect. Ergot in full doses should be administered, until its full physiologic effect on the circulation is obtained, and the nervous system should be not only depressed, *but absolutely held down*, by the use of morphine, codeine, or hyoscine. These cases will take enormous dose of the narcotics; I have in several instances been obliged to give small children half a grain of coedine sulphate hypodermically, in order to get any satisfactory quieting effect. As there is no diseased condition in which the indications for the use or withdrawal of a given remedy so quickly and so radically change as in acute lept meningitis, the utmost caution is needed in the administration of medicines. The temperature must be carefully watched, as

it is irregular, and sometimes drops rapidly under ice, and there is danger of driving it subnormal and bringing on collapse. The bowels must be kept open by the use of cathartics, and all effort must be made to maintain intestinal peristalsis. The bowel may be helped out by the use of high enemata.

In collapse give a hot bath, 103° F. to 107° F. and push active stimulation. Nourishment is maintained by soups, strong broths, milk, whisky, brandy and water. As the patient begins to recover, the dietary is increased and tonics are given, together with iodine in some form, and mercuric chloride.

MECHANICAL VIBRATION-THERAPY.

EDITED BY FREDERICK H. MORSE, M. D.

The Combined Use of Mechanical Vibration and Light in Therapeutics.

Dr. W. R. Rushin, Macon, Ga., sends to the Editor a description of the following method of employing light and mechanical vibration jointly in his treatment:

"My experience with the use of mechanical vibration with light and radiant heat from the high-power incandescent lamp, which I have been using separately for several years, has been followed by excellent results. For the past few months, however, I have combined the two and have achieved results that were far superior to the former method as used separately. In instances with cases of dysmenorrhea, sciatica, and inflammatory rheumatism, it formerly took from three to fifteen treatments to give relief and bring about resorption of the exudates around the joints. Now, one to five applications does the work, giving complete cessation from pain after the first treatment. As an adjunct to the medicinal treatment of diseased conditions, I find the method invaluable.

As to technique of employment, I first turn on the high-power incandescent lamp for three or four minutes and then begin the vibration, while allowing the light to shine directly in the points being treated with the vibrator. I find that patients can bear much higher degrees of heat from the concentrated light while the vibrator is vibrating, than when it is not operating. I also find that penetration is much deeper, thereby producing a more decided effect, through inhibition or stimulation as the case may demand, than with the use of the vibrator alone. Again there is a hyperemia induced by the light and heat from the lamp that is much to be desired in these cases, by reason of the leucocytosis produced thereby enhancing local metabolism to a marked degree."

The writer considers this method of treatment wherever it can be applied to be a most rational therapeutic measure, because the effects are both physiological and philosophical; certainly so in chronic and blood stasis conditions.

STATIC ELECTRICITY.

EDITED BY J. H. BURCH, M. D.

A Plea for Static Electricity. By Margaret M. Sharpe, L. R. C. P., Archives of the Roentgen Ray, January, 1907.

The writer narrates a case which she saw while attending the clinic of Prof. Charcot of the Saltpetrière, where among his patients was a diabetic with a paralyzed arm, middle-aged, thin, and feeble. He was submitted to the static treatment, under Dr. Vigouroux, and after six weeks was again shown to the students. The sugar had diminished more than one-half, the arm had recovered almost entirely, and the whole change was for the better. From the results obtained by Dr. Vigouroux the writer was convinced of the extraordinary influence static electricity has upon human metabolism. She also refers to a work of John Wesley's in which he lauded it as a very near approach to the panacea of all ills. She attributes the disuse and neglect of the static machine to a difficulty in making it to function under every condition of weather. She had the good fortune to possess a machine of the Wimshurst type, which the late Mr. Wimshurst ordered made for her, and which she has used for the past fourteen years with the utmost satisfaction. The writer refers to the wide range of indication for static electricity and suggests that there are some conditions in which it exceeds in value any other known remedy. She refers particularly to its value in conditions of depressed vitality; cases, in which force has been given out beyond the recuperative power of the patient, from various causes. She has succeeded in numerous cases that have tried drugs, change of air, massage, water cure, and rest cure. The tonic effect of static electricity is a valuable adjunct, particularly where there are loss of appetite and loss of sleep. She recognizes the importance of correcting faulty metabolism and locally applied for the relief of pain and swelling, and reabsorption of exudation. Under its influence an increased range of movement can be obtained after years of rheumatoid arthritis. She calls attention also to the fact that many of these conditions are not so liable to recur after treatment by electricity as by other methods, and cites a case of lumbago which recurred every year for many years, but after treatment by static electricity

there was no recurrence for ten years. In the local treatment of joints, she employs the current produced by putting two Leyden jars and an Oudin resonator in circuit with the machine, by which she derives a shower of sparks which may be administered without distress to the patient, and have a speedy influence upon the swelling. These sparks may be used even upon the face without causing pain, and are of great service in skin diseases, malignant or otherwise. She contests the claim of Delheim and Lacquerreire who take to themselves the credit for having instituted this treatment for epithelioma, whereas she recorded a case at a meeting of the Roentgen Ray Society four years ago. The writer finds the combination of general static treatment with local treatment by indication valuable, especially in eczema and psoriasis. In the later disease she was not able to effect a permanent cure, until the two methods were combined.

The writer gives credit to the Americans for having found out the estimable value of static electricity in drug habit and alcoholism, acknowledging that static electricity is there (in America) "estimated at its full value, whereas in England, it is too often regarded as a sort of fetish or miracle worker, worthy only of the attention of quacks." The writer speaks farther of the value of the static spray in the treatment of all sorts of ulcers, including those which have resisted other forms of treatment for years, and refers to its value in arresting or preventing x-ray dermatitis.

She concludes by stating that there are many other modes of using the current from the static machine, including the induced current and the induction of the x-ray, and also that with the use of the resonator it will produce high-frequency currents. She states quite positively that the high-frequency and static currents do not resemble one another, and cannot produce the same effects, which is the opinion of all observers who are familiar with the static current.

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Some Facts about Digestive Ferments.

Torald Sollman (Jour. A. M. A., February 9, 1907) considers the fate of the digestive ferments in the alimentary canal, and raises the question as to whether there really be any therapeutic indication for the employment of them internally.

Pepsin, as the stomach is peculiarly the seat of its activity, may become active when artificially introduced.

The experiments of Grützner have shown that after the ingestion of a full meal, the greater mass of the food lies quietly in the fundus for a considerable length of time, only a small portion of it being drawn up at a time into the pyloric portion to which the churning motions of the stomach are chiefly confined. Also the reaction within the main mass of the food remains alkaline for some two hours after its ingestion. It is therefore evident that the diastase of the saliva has an opportunity of exerting its action during this time. The same is true of diastase artificially introduced; but diastase so introduced is not generally diffused throughout the food, and the quiescent condition of the fundus and the slowness of diffusion of the ferment, prevent its intimate mixture and allow only a small surface of food to be exposed to its action. The same is true of trypsin, and with this ferment it is also doubtful if the alkalinity of the gastric contents is ever sufficiently high to allow of its effective action.

As it is also doubtful if either diastase or trypsin ever survive gastric digestion, it is evident that the latter, at any rate, cannot be effective unless administered in "enteric" capsules.

Granted, however, that they may possibly exert some action he very pertinently inquires: "Are there any therapeutic indications for the internal use of digestive ferments?"

"Digestive ferments," he continues, "are administered on the theory that they supplement a faulty digestion. Evidently they could only be useful if the digestive disorder is due to a deficiency of ferments. This, however, appears to be a rare condition, and the use of ferments is bound to be useless when the dyspepsia depends on the alterations of acidity or on motor insufficiency or on bacterial fermentation. Even when the ferment is really deficient it is doubtful if the condition is properly met by giving pepsin."

The Effect on the Rabbit's Aorta of Intraveneous Injections of Suprarenal Extract.

Kaiserling (Berliner klinische Wochenschrift, January 14, 1907) finds that in eight rabbits treated according to the recognized technique the results were practically negative. His conclusion that the etiological relationship between such injections of suprarenal extract in rabbits, and the production in them of aortic disease cannot yet be accepted, is in accord with those of most of the more recent investigators. In this connection is of interest a case which came to autopsy under our investigation. The patient, a sufferer from frequent daily attacks of "asthma" for several years, was finally given suprarenal extract, 1-1000, hypodermatically. During the last two years of his life he received an average of from 40-60 minims

daily. He was a man of about fifty, and his aortic arch was practically free from atheroma.

Opsonins and Treatment by Bacterial Vaccines.

J. L. Bunch (*Lancet*, January 19, 1907) reports a case of lupus and one of tubercular epididymitis cured by injections in accordance with this theory. He emphasizes the importance of small dosage that the undesirable "negative phase" may be rendered as small as possible, for if too large a dose be given, or if it be administered while the index is still falling, then the positive phase will appear only late or if the patient's resistance be too greatly diminished, not at all.

DEPARTMENT OF QUERIES AND ANSWERS.

MILLERTON, PA.,

January 25, 1907.

Dear Doctor: Would you, in your next issue of the *JOURNAL*, explain what the Morton's Wave Current is, and the methods of producing it?—DR. C. W. HAUSER.

The current known as the Morton Wave Current was published by Professor William James Morton, M. D., in the *Bulletin Officiel de la Société Française d'Electrothérapie*, of January, 1899, and later in the *Electrical Engineer* of March 4, of the same year, and by the writer both in the *Medical Record* of March 3, 1900, and in the *Transactions of the American Electro-Therapeutic Association* of 1900.

The unique characteristic of the current consists in the fact that it is administered to the patient when insulated and connected to but one side of the static machine, a current in which only one polarity approaches the patient. The connection is made preferably to the positive side of the machine, and application is made by metal electrodes, or from wet sponges, or other thoroughly moistened material. By grounding the other side of the machine, the effect of the current is greatly intensified. An essential feature of the current is the discharging spark-gap between the poles of the discharging rods, producing oscillatory effects in the rise and fall of potential, during the periods of charge and discharge of the patient upon the insulated platform. The current is one of the most valuable additions to therapeutics and is employed both for its local effect, in the treatment of inflammatory conditions, and for its tonic effects upon general metabolism, inducing activity generally throughout the body by its surgings to and fro, from

the surfaces of the body, to the surfaces of contact with the electrode in the instants of charge and discharge.

Dear Doctor: Will you kindly advise me as to the value and uses of the 500 candle power Leucodescent light. Am somewhat acquainted with the action and value of the light in the treatment of skin affections, but am almost totally ignorant as to the value in deep-seated areas: such as exudates in and about the uterus and its adnexa. Will you kindly advise me as to the efficiency in this line of cases?—
B. S. SULZBACHER, Kansas City, Mo.

The field of indication for the employment of this type of lamp is very large. The particular lamp to which you refer gives me marked satisfaction in the treatment of the whole range of inflammatory conditions, septic and non-septic. Its potency will depend on the depth of the lesion, and the character of the congestion present. In early inflammation before there is an organized exudate or established stasis, the energetic application of light is generally capable of relieving the condition. Lumbago, superficial neuritis, congestion of the abdominal viscera, and painful areas, are remarkably influenced by this application. It is my practice to apply it until an intense hyperemia is produced over a large portion of the trunk, particularly over the involved area. There is no other agency, except possibly the static wave current, which improves the general nutrition and increases body weight as the general administration of light in this manner. It is as applicable to a marasmic child as an adult suffering from the conditions of poor metabolism.

With reference to the relief of exudates in and about the uterus, light is not particularly active except in so far as it is capable of retarding the process. The use of high-frequency currents from a large ampere source or the D'Arsonval of a static resonator applied by a vacuum tube, in the rectum or posterior fornex, or both, are indicated when there is a suspicion of pus. The application of the vacuum or metal electrode over the same sites, directly from the static machine, the static wave current, are very energetic in relieving local stasis and congestion present in non-septic inflammatory processes in those regions.

Probably there is no agent so energetic as the X-ray from a high vacuum tube in promoting the absorption of adventitious tissue in the pelvic region, as of keloid or scar tissue in the skin; but this agent must not be used without considering the danger of inducing sterility.

[Editor.]

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HIGH-FREQUENCY CURRENT IN OPHTHALMIC PRACTICE.*

BY L. WEBSTER FOX, A. M., M. D.,

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Pennsylvania.

I approach this subject with considerable hesitation, feeling confident that among my hearers are electro-therapeutists who do understand something about this subject, and who should be giving to the profession the benefits of a more thorough and extended experience. My limited knowledge has been gleaned from such authorities as Guilleminot, Freund, Cohn, Piffard, Snow, and others.

My work has been of an experimental character, watching all cases and making careful notes of the failures and improvements in such special diseases which might be of some value to the ophthalmologist. Unfortunately, little has been done by the advocates of the high-frequency current in the unexplored field of ophthalmology.

The current used in my work was obtained by changing the direct current of relatively low tension, that is, the dynamo direct current of our lighting system in the Hospital into an oscillating current of exceedingly great rapidity and high tension through a large Ruhmkorff inductor, Leyden jars, and Qudin resonator. The applications were made directly to the eyelids by a Wappler vacuum spiral tube and directly to the eye-ball (cornea) by specially devised vacuum eye electrodes, single and double. The time of application varied from two to twenty minutes. I did not use the static machine, but when used the current should be taken directly from the machine. My friend, Dr. David H. Coover, of Denver, first called my attention to his success in the use of the high-frequency currents in a certain class of eye diseases. Following his sug-

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Philadelphia, September 1, 1906.

gestions I had my chief of clinic, Dr. John A. Brophy, select a variety of cases from blepharitis marginalis to atrophy of the optic nerve. These cases were then placed under the charge of Dr. A. Weise Hammer, chief of the electrical department of the Medico-Chirurgical Hospital, who carried out the treatment with the greatest care and accuracy. The majority of cases received the treatment three times per week, some few varieties received daily treatment; the length of the treatment varying from two to twenty minutes, and each patient was kept under treatment until I felt assured no benefit could be derived.

Blepharitis marginalis, all forms—100 cases. It was most gratifying to note that while the treatment was more or less difficult to carry out with children, yet in those (100) cases to which it was applied the cure was rapid and apparently permanent. The cases were treated with the spiral vacuum tube ten minutes daily for two weeks.

Granular lids—10 cases. After twenty-one treatments to each case there was no apparent benefit, so this was abandoned. It must be noted that the current was passed through the eyelids, and not against the everted lids—the secretions were possibly lessened.

Ulcers of the cornea—25 cases. This covered all forms of ulcers, from simple to Saemisch. The application was made through the eyelids and also directly to the cornea. In the non-vascular, but slight benefit was noticed after ten applications; while with the same number of applications in the ulcerated type, where there was destruction of tissue with pus shreds, the current seemed to retard the destructive process; and in one case of Saemisch it was cured without the aid of drugs or operative procedure. The single electrode was applied directly to the cornea under cocaine in all these cases. My judgment is that the high-frequency current is of some value in these cases, but still I would have to enlarge my experience before replacing it by our known and older methods of treatment.

Iritis—5 cases—three specific, two rheumatic. The usual internal treatments, as well as local, was not suspended in these cases. Ten applications were made day by day. There was no noticeable change for the better in the reduction of the congestion of the blood vessels, nor was there a notable change in

the color of the inflamed iris, but the pain was certainly lessened. In one case, where the supra- and infra-orbital pains were intense and nothing but dionin relieved these pains before the application of the high-frequency current, the effect of ten minutes' treatment during the painful attack was magical; it gave instant relief, which lasted for three or four hours.

Ophthalmoplegia interna—1 case. Ten applications were made over the superior ganglion of the cervical sympathetic without contracting the dilatation of the iris. This treatment was suspended and other means of treatment adopted.

Vitreous opacities—20 cases—including all forms, from simple hyalitis to the marked products of chorio-retinitis, cyclitis, and hemorrhages. These cases were given a great deal of attention. While in the majority of cases there seemed some clarification, yet the total outcome did not show as much improvement as was found subsequently under the constant current—voltaic alternatives—and saline injections. I was determined to give this most troublesome condition a thorough trial. As many as fifty applications were given to the cases that gave even slight encouragement. Evidently, the cathaphoric action of this current is not the same as that of the constant current.

Retinitis pigmentosa—3 cases. Characterized by marked deposit of pigment, diminution of the blood vessels, pallor of the disk, and contraction of the visual fields down to 10, 20, and 30 degrees respectively. Vision ranging from 20-200 to 20-50. The patient who showed the most marked improvement was a female thirty-two years of age. From January 8 to March 28, 1906, thirty-one applications were given. The patient lived some distance from Philadelphia, and was obliged to return home. To continue the good results obtained, she took home with her a dry cell battery with instructions to apply the weak current three times weekly. The negative pole to be placed over the eye and the positive pole to the back of the neck or the temple. The other two cases did not show as marked improvement, both being older, forty-eight and fifty-two respectively, but both fields were enlarged and the vision slightly improved.

The action of the high-frequency currents here is somewhat similar to the constant current, and under similar conditions probably productive of the same results.

Amblyopia toxica—tobacco and alcohol—3 cases. The treatment in these cases did not consist alone in the high-frequency current, although it aided materially in rapid restoration of vision. The use of alcohol and tobacco were strictly forbidden, a Turkish bath, twice weekly, demanded, and internally, ascending doses of tinct. nucis vomica, commencing with 15 drops, three times daily, ascending to 35, then falling back to 15 drops. Good nourishing diet and outdoor exercise advised. The number of applications was from ten to twenty.

Amblyopia exanopsia—10 cases. It was to this series of cases that my attention was first called by Dr. Coover in a personal interview about one year ago. He has since published his observations in the New York Medical Record, October 14, 1905. I can confirm his observations in every detail. The younger the patient the more rapid the recovery. My youngest patient was six years of age.

One patient, aged fifty-two years, an engineer on one of the leading railroads in Pennsylvania, had a marked squint and also amblyopia exanopsia. The Company was re-examining all the employees of the road, and among others he was requested to consult an ophthalmic surgeon for his physical defects. Dr. Coover was in Philadelphia at this time and he examined the patient with me. The eye was successfully straightened—defect four lines—and three days later the high-frequency current was applied to the amblyopic eye. The applications were made daily until thirty had been given with the glass spiral vacuum tube; the sittings lasting from three to fifteen minutes. The result obtained with his uncorrected hyperopia was from 15-200 to 20-50 and with a correction of + 1.50 Sph. to 20-40. His left eye had a hyperopia of + 0.50 and vision equaled 20-20 without the glass. As he had been in the employ of the company for many years he was permitted to retain his position and he is now at work.

From my experience with those ten cases of amblyopia exanopsia I am quite sure that we have a curative measure much more simple and radical than the fusion method with the amblyoscope. I have found it requires great patience to train small children, and even well-grown boys, to practice with and use this instrument. I predict that it (the amblyoscope) will soon be relegated to that ophthalmic graveyard where so many instruments of precision lie buried.

Retinitis proliferans—2 cases—ten applications. There was no change in the retinal deposits nor in the connective tissue growths in the vitreous, although the vitreous did become a little clearer. This was probably due to the absorption of the delicate flocculi floating in the vitreous.

Retinal hemorrhages—10 cases—four due to anemia, one to injury, five to albuminuria. Eight of these cases improved after two or four weeks' treatment. Two cases of albuminuric retinitis associated with marked arterio-sclerosis and optic neuritis did not clear up and local treatment was of no avail. The arterial tension was very high, 200 cm. The three milder cases were benefited temporarily—these cases are still under medical treatment.

Optic neuritis and optic atrophy were not benefited by this treatment alone, although one case of the first mentioned and ten of the latter disease were given a thorough and prolonged course. In this case of optic neuritis, as soon as it was found that the disease was progressing, other treatment was inaugurated as well.

Glaucoma, chronic—5 cases. Ten applications were made, but no change either in tension or lessening of the tortuous blood vessels of the sclerotic was noticed. I did not venture to use it in any case of acute glaucoma, as loss of time was too great a risk to the vision, and we do know the result of the operative procedure.

Freund states that, "When acting beneficially high-frequency currents modify the process of nutrition in badly ulcerated conditions and in parietic states of certain tissues, thereby promoting the healing of the former and the resumption of functions in the latter."

I also quote from Guilleminot, who wisely states in regard to electricity in general, "If the progress of science finally enables us to master this force, which is the very essence of life, and to subjugate it, as steam has been subjugated to the service of mankind, we shall have ready to our hands the most potent curative agent imaginable to modify the volition and ameliorate the condition of living beings."

As this paper is merely a preliminary one, I hope that I shall not be criticised for giving my statistics in such a vague or indefinite, or what might still be called non-scientific manner for

a meeting of this kind, yet it must be remembered that I started out on the simple lines of experimentation and I am simply giving my limited experience so that others may be induced to follow in this same field, so that we may cull out the "wheat from the tares."

1304 Walnut St.

BIBLIOGRAPHY.

- "Sparking Machine," Benjamin Franklin.
- "Diseases of the Eye," James Ware
- "Radio-Therapy," Freund.
- "Electric Diagnosis and Electric Therapeutics," Toby Cohn.
- "Electricity in Medicine," W. H. Guilleminot.
- "High Frequency Current; High Frequency Technique," Henry G. Piffard.
- "High Frequency Currents in the Treatment of General Diseases," Chisholm Williams.
- "Electricity in Electro-Therapeutics," Houston and Kennelly.
- "Radio-Therapy and Photo-Therapy," Charles Warrenne Allen.
- "Medical Electricity," H. Lewis Jones.
- "Transactions of the American Medical Association," Boston, 1906, W. Franklin Coleman.
- "High Frequency Currents in Non-Toxic Amblyopia," David H. Coover.

Discussion.

Dr. F. Barrett, Westbrook, Me.: In a case of optic neuritis treated for about three months with other than electric treatment with no result. With the high-frequency current from a static machine I then employed a Piffard hyperstatic and completely relieved the neuritis in two months. I gave six ten-minute treatments every other day.

Another interesting case was that of a boy with alopecia of two years' standing. The head was entirely bald. I began treatment two months ago and the boy's head is now almost covered with hair. In another case of not so long standing half a dozen treatments gave complete cure.

Dr. William G. Schauffler, New Jersey: I would like to ask Dr. Fox whether in the employment of electricity here in the College they have used, apart from the high-frequency current, any form of light. My experience has been that light, especially the blue light, has been very useful in many of the conditions in connection with the high-frequency current.

Dr. William Benham Snow: As I am not a specialist I cannot speak with the same authority as can Dr. Fox. I have had experience with a number of cases in which the eyes have not been properly refracted for glasses and in some of which there was astigmatism, causing head ache and eye strain. I find that the application of the vacuum tube double eye connected to one side of a static machine with the other side grounded and the spark-gap length adapted to the case gives gratifying results. By this means a distinct vibratory action arising from induced cell contraction sets into activity the structures of the eye, improving nutrition, and relaxing the ciliary muscle, re-

lieving the tension. In two cases of retinitis pigmentosa there was marked benefit in one and an absolutely negative result in the other. The administration of the high-potential current from the static machine, administered as described, has been satisfactory in ulcers of the cornea. In cases of local congestion, the indurated tissue is thrown into contraction and with the spark discharging at the spark-gap at a rate of two to six hundred per minute, there are intervals of tissue rest which give the effect of an intrinsic massage thereby softening the tissues and re-establishing circulation, followed by prompt repair. This is easily demonstrated in cases of inflammation with obstruction of the tear duct in which complete relief was obtained with one five-minute application in a case of but few days' standing. These instances as indications of the possibilities of this method.

From an experience with one of my own children I have come to believe that by this method children with slight errors of refraction can be carried through adolescence without being handicapped by the subsequent wearing of glasses. I believe that by the correction of these slight dispositions to contraction and tension arising from overwork in childhood which take the eye out of its natural form, we can eliminate the possibilities of more serious errors.

Dr. S. Lewis Ziegler, Philadelphia: I have used the high-frequency currents somewhat, possibly not with as great success, because I am thoroughly convinced of the advantage of the constant current. Dr. Alleman of Paris has used the high-frequency current with somewhat of success, but I think he has again reverted to the constant current. Of course, the methods of application are still tentative, and it may be that there are living potentialities in this method to be brought out later. The cases referred to by your President are quite amenable to the constant current. Retinitis pigmentosis, if it yields to anything, yields to the constant current. I have seen the condition yield in a number of cases to the constant current. The inflammatory lesions yield more promptly to the constant current on account of the electrical action.

Dr. Alleman some years ago prepared an electrode for direct application to the cornea through a globule of mercury more especially for the scar resulting from corneal ulcer, but I think direct application of the electrode to the cornea is better than through the medium of the globule of mercury. I have seen some cases that did not yield to high-frequency currents which did yield to the constant current, especially atrophic cases.

Dr. William W. Eaton, Mass.: I have still a good deal of faith in the constant current in these cases. I have found the most satisfactory results in conjunctivitis and inflammatory states. One case of some importance was that of a patient

about thirty-eight years of age, who had a family history of cancer running through one or two generations. She came to me about a year ago with three nodules in the upper eyelid, the smallest being the size of a pea, another twice that size. They were more or less painful and had caused inflammation in the conjunctiva and in the eye itself. I did not want to risk the x-ray, not feeling sure of the effect upon the vision. I gave her a number of treatments with the constant current and then varied, using the high-frequency with the spiral or vacuum tube. A few treatments made a perfect cure of the hardened masses in the upper lid. I saw the case five or six months ago and it was then free from disease in the eyelid.

Dr. G. Oram Ring, Philadelphia: I have had practically no experience in the application of the high-frequency current, but I would like to ask the President if I understood him to say that his little daughter was hypermetropic and astigmatic?

Dr. Ring (continuing): I understood Dr. Snow to say that he proposed by treating his daughter twice a week to do away with glasses. In hypermetropia alone this would be difficult to do by the substitution of electrical treatment for glasses.

The President (answering Dr. Ring): She was not astigmatic.

Dr. J. D. Gibson, Denver: I am glad to hear that Dr. Coover's work has spread so far in its influence and that it is leaving its impress in the Medico-Chirurgical College. Dr. Coover has been accomplishing a good deal with high-frequency currents and the x-ray in Denver and has aroused much enthusiasm among the specialists there in this work.

From the history of high-frequency currents I would expect the best results in granular lids by the direct local application, which would give both the general and local effect. I believe there is a special electrode made for treating under the lids.

Dr. Fox (closes): In answer to Dr. Schauffler I would say that I have not tried the various lights. I have one of Dr. Schauffler's lamps and we did try it for the hypnotic effect, not from the therapeutic standpoint.

We have been trying to extend this field to see what we can accomplish with the high-frequency current, and as Dr. Gibson has suggested, Dr. Coover was one of the men who created this enthusiasm within myself. I thought that if we could stimulate the retina to come back within the normal range we would gain much. If there is anything to be obtained from electricity in the general field of ophthalmology we would like to find it out. In granular lids, we believe the grattage operation is better than the application of the high-frequency current to the everted lid in that it saves time. If the high-frequency current will make an amblyopic eye useful we desire to use it.

CATAPHORIC TREATMENT OF CANCER OF THE FACE.*

BY SAMUEL MCCLARY III, M. D., PHILADELPHIA, PA.

When there is no lymphatic involvement cancer of the face is probably best treated by cataphoresis. (1) Because only diseased tissue and a small amount of healthy tissue are destroyed. (2) Because the resulting scar is less conspicuous than by any other method, except possibly x-ray treatment. (3) Because the danger of implantation is eliminated. There are many successful results with the knife; but the resulting scar is very conspicuous and there is great danger of implantation. X-rays have cured a few cases, but many seem to be aggravated by this treatment.

For the cataphoric method we can use the direct electric light current or the current from dry batteries. Forty Columbia dry cells will furnish all the current required. The controller must be of the universal therapeutic type, which permits smooth control of the current from a fraction of a milliampere up to a thousand or more. The meter should be accurate and have two scales, one from zero to two hundred and the other from zero to two thousand; the Weston meter is probably the most satisfactory.

Dispersing electrode.—It is important that we eliminate as far as possible the action of this electrode as unsightly burns are frequently the result at the negative pole. Large clay pads, made of duck filled with potter's clay, have proved the most satisfactory material for this purpose. The wire leading from the negative pole of the controller is attached to a thin lead plate which lies on a piece of water-proof. The clay pad is thoroughly moistened with warm water and placed over the lead plate, great care being taken to see that the lead plate is completely covered and that the wire leading to it is covered by a piece of non-conducting cloth, so as to prevent a short circuit and consequently a distressing negative burn. When possible it is best to have the patient lie on the dispersing pad as the back presents the best surface and the weight of the body keeps the entire pad in good contact.

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association, September 20, 1906.

The active electrodes are best made out of sheet zinc in size varying with the character of the case and the choice of the operator, insulated as far as necessary by rubber tubing or coating them with sealing wax, which is very handy and satisfactory. Each electrode before insulation is attached to fine copper wire enabling the instrument to be self-sustaining when inserted. Before use, the electrodes are amalgamated with mercury, which is effected by first dipping them in a weak solution (ten per cent.) of sulphuric acid. The electrodes are connected with the positive pole, and after being inserted in the growth the current is turned on. The strength of current and duration of application depend entirely upon the extent of the growth and the patient's endurance. Small growths may be treated without anesthesia and some patients will stand as high as thirty milliamperes, but a growth larger than a pea is best treated under general anesthesia and great care should be taken to watch the heart and respiration. Four or five hundred milliamperes are as high as it is safe to use when operating on the face. The current should be turned on very gradually and any marked change in the heart's action or respiration demands lessening of the strength of current. The current is kept up until in the judgment of the operator the area of necrosis includes the whole growth as well as a small amount of healthy tissue, which is indicated by a grayish discoloration due to the deposit of zinc and mercury and the dehydration of the tissues. The after-treatment is very simple, sterile dressings are applied and powdered zinc oxide or zinc ointment may be applied. The slough comes away in from seven to twenty-one days and the cavity fills in with granulation tissue. If a large area has been destroyed the contraction may be lessened by applying skin grafts after the granulation tissue has gotten well started. Any signs of recurrence should be immediately treated, but it is wise in the first treatment to thoroughly complete the destruction, for if this is not done the disease seems to take on increased vitality and its progress may be extremely rapid.

The bipolar method.—In some cases in which the current is not well borne the bipolar method is useful, as it does not embarrass the heart or respiration and practically any strength of current may be used. Consequently the duration of the operation is thereby lessened, which is an important factor on account of the anesthetic in many patients. The technique is the same in the bipolar method except the negative pole is attached to a large electrode, which is placed in the center of the growth, while positive electrodes are placed more toward the periphery.

308 S. Fifty-second Street.

ELECTRO-CHEMICAL STERILIZATION AS APPLIED
TO MALIGNANT DISEASES OF THE ORBITAL
AND NASAL REGIONS.*

BY G. ORAM RING, A. M., M. D., PHILADELPHIA, PA.,

Ophthalmic Surgeon to the Episcopal Hospital, Philadelphia; Ophthalmologist to the Widener Memorial Home for Crippled Children, Philadelphia; Consulting Ophthalmologist to the American Oncologic Hospital, Philadelphia.

Mr. Chairman and Members of the American Electro-Therapeutic Association:

It is my purpose to direct your attention to the value of *Electro-Chemical Sterilization* as one of the very valuable adjuncts in the treatment and inhibition of certain types of malignant disease of the nasal and orbital regions.

The bloodless devitalization of a malignant neoplasm, with the possibility of carrying the sterilization with precision beyond the growth into a region where some latent cells may be present and finally into healthy tissue, presents for your consideration a process of immense importance with far-reaching possibilities for good.

I will ask you to permit me to speak most briefly and perhaps somewhat dogmatically regarding the process, because of having earnestly watched its progress and studied with considerable care some of the types of disease to which it is adapted.

If we are dealing with an epithelioma of the ocular adnexa in the early stage, the beneficent discovery of Professor Roentgen places at our disposal a method which with perfected technique and exact dosage, is yielding most satisfactory results. Should this method not inhibit the growth and produce complete cicatrization, excision with or without plastic operation may be considered, provided the position and extent of the growth should justify the procedure. It is, of course, most important to preserve the integrity of the eyelids if possible. Therefore, in some instances, plastic surgery must be considered. If a recurrence should be noted, the application of cataphoresis after the method demonstrated to you will likely

* Read before the Sixteenth Annual Meeting of the American Electro-Therapeutic Association, at Philadelphia, September 19, 1906.

be curative. Other cases lend themselves at once to this treatment.

I have recently discussed the treatment of orbital sarcoma in a paper before the College of Physicians, and wish simply to remind you that if the modern viewpoint is accepted as correct, that every primary malignant growth is at first purely local and you further consider that in the most extensive experience of Knapp, of New York, every orbital sarcoma he ever removed, with one exception, recurred and the patient died, then with proper dosage and exact technique, a method that makes possible the destruction without subsequent stimulation is entitled to a most important place in our advanced methods of combating this extremely grave form of neoplasm.

The experience we have thus far had encourages us in the belief that in the absence of metastasis at the time of beginning treatment, we will be able to control such growths.

I recently presented before the Ophthalmic Section of the American Medical Association a paper, defining the present position of the x-ray as a therapeutic agent, as applied to ophthalmic disease, and considered the result in a large number of cases gleaned from a study of the literature of the foremost workers on both sides of the sea.

Some of these cases, distinctly inoperable, illustrated the illuminating outcome of this form of radiant energy to malignant disease of the nose and accessory cavities, where extension into or from the orbit indicated the widespread pathological involvement.

It is conceded that the Roentgen ray is not by any means uniformly successful in inhibiting malignant disease. The following clinical history will serve to indicate the possibilities for good in electro-chemical sterilization of malignant nasal disease after failure of x-ray therapy.

The patient, Professor S., is here for your inspection, and gives the following clinical history:

Bleeding began from the nostrils, a few drops at a time, in September, 1904, and gradually increased until about December 1, at which time he was treated for a so-called abrasion of the mucous membrane of the septum. A spur that was thought by his physician to be responsible for the hemorrhage was shortly afterwards cauterized. Following this procedure, a

growth was soon in evidence, largely filling the left nostril. This was snared and cauterized by his physician in April, 1905. It promptly recurred and in four weeks was larger than before, bleeding frequently and copiously.

A consultation in May, 1905, resulted in the second removal, which was followed by the application of the x-ray.

About fifteen treatments were given, notwithstanding which, the growth increased and again late in June was removed for the third time. A second x-ray specialist was then consulted, who gave a series of treatments, during which the growth continued to increase, and the physician declined to operate further.

He was referred to the Oncologic Hospital on July 24, 1905, at which time the left nostril was filled with a bleeding, granulating mass, involving the septum, the nasal floor, and the membrane covering the inferior turbinal.

The following day the operation of cataphoric sterilization under ether was performed, a large slough being removed in about ten days. Five minor treatments between November and March, to remove small granulating areas that were also epitheliomatous, completed the treatment.

There is a septal perforation at the site of the growth, and an adhesion between the septum and the left inferior turbinal. All trace of the former disease has disappeared, the case illustrating in a very striking manner one of the methods destined to occupy a very important place in treatment of malignant disease.

1900 Chestnut St.



CONCENTRATED WHITE LIGHT.*

BY F. BARRETT, M. D., WESTBROOK, ME.

Dr. Charles W. Allen says in his work on "Radiotherapy" that all judicious practice should be based upon theory, and the use of light in phototherapy is no exception to the rule. It is here, as elsewhere, that it is often difficult to make theory and practice agree. In order to have a just appreciation of the wonderful discoveries in the light-science of recent time as it bears upon its therapeutic application, it is necessary to pass briefly in review the various theories advanced concerning the nature and transmission of light. We should go a step further and review the physical as well as thermal properties of light and its effects on organic life.

Light is one form of vibratory energy, it travels through ethereal space at about 300,000 kilometers per second. The quality of light depends on the rate of vibration per second, at 390,000,000,000,000 it produces the color sense of red, at 760,000,000,000,000 it produces the color sense of violet. The rays below the red, or the infra red, are called the heat rays, and the rays above the violet, or the ultra violet, and part of the violet and blue rays are called the chemical or actinic rays.

The combined rays of the entire spectrum produce what we know as sunlight or white light.

That the sunlight is the greatest germ-destroying agent is accepted as a demonstrated fact to-day.

The fact that sunlight would cure skin diseases was known to the ancients though they did not know how it was brought about.

Refraction of Rays.

Rays are refracted while passing through a prism according to their length, the shorter the wave length the greater the refraction; this applies to the whole spectrum, the invisible as well as the visible rays, or in other words, from the infra red to the ultra violet inclusive.

The difference in color is due to the greater or less vibration

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Philadelphia, September 21, 1906.

of the ether causing different wave lengths; each portion of the spectrum being known by its wave length.

The violet or chemical end of the spectrum generates very little heat, as these rays are absorbed by glass, so in order to get their chemical effect on diseased tissue, they must be used or studied from an open arc or through quartz lenses.

We will now briefly touch upon the chemical action of light.

Except the amblyopsis, or blind fish and bacteria, organic matter requires white light for its development. Allen says all evidence seems to point to the presence of light as absolutely necessary to all form of animal life, and to indicate the rays below the blue as the active agents.

There are a number of facts that are established on a scientific basis: First, the entire spectrum has a double action, reducing and oxidizing, the former at the violet, the latter at the red end of the spectrum. Second, all rays are capable of exciting chemical action in various degree. Third, all rays which exert any action upon a substance or body are absorbed by that substance or body.

It is an established fact that the white leucocytes are not affected by light, but the red corpuscles are nourished.

The most important question in phototherapy is the action of concentrated white light on bacteria. As this topic is so extensive and time is limited, to all those who wish to familiarize themselves on this important subject, I would refer them to Dr. Cleaves' admirable work on "Light Energy."

In passing I will briefly mention Bie's experiment on bacteria. Using a large arc lamp of 35 amperes, he found that the non-chemical portion of the spectrum (the red, orange, yellow, and green) inhibited the development of bacteria prodigiosus in six minutes, the same action with the entire spectrum was accomplished in only one quarter of a minute, proving that white light was twenty-four times stronger.

It has been shown that animals are much more stimulated in white light than in the red, orange, yellow, or green, and the action of the blue rays are greater than the others, and only less intense than the white light, and the violet rays exert a power quite as great as the white light, from which it is supposed that the violet end of the spectrum is in a great measure responsible for the effect produced.

Until two or three years ago there were only the arc lamp and the small incandescent lamps. The arc lamp on account of its cost and the expense of its maintenance has kept many physicians from using it, and the incandescent lamp did not meet the requirements.

About two years ago my attention was called to a lamp which was being used in the coloring and paper-sorting department of our paper mills on account of the white light it emitted and the ease with which the various colors could be sorted.

On investigation, I found it gave a pure white light, the nearest to sunlight of any artificial light I had yet seen. I had one having six glowers, or 500 c. p. lamps installed in my office. I have found it thus far very satisfactory.

It has the following advantages: First, and most important, as glass absorbs the rays of the upper end of the spectrum, the violet and ultra-violet, the lamp can be used without a glass globe, used as an open arc, thus getting all the effects of the actinic rays. Second, if different colors are desired, you have only to use a globe of the desired color, which is quite a saving from otherwise buying a separate lamp for the different colored lights.

The Cost of Maintenance.

The outfit such as we use in our office not being in the market, we purchased the lamp and had the hood and other attachments made according to our own idea, at a cost of about forty dollars. The cost of current consumption will vary with different electric light companies. With us the cost is 10 cents per 1000 kw., the 500 c. p. or six-glower lamp uses about 10 kw. per hour. With the same amount of power the Nernst lamp is practically twice as efficient as the incandescent lamp. In other words, for the same number of candle power you consume only about one-half the power or current that you do with the incandescent lamp. One more item of economy: if one or more glowers are burned out you can have them replaced at a cost of twenty-eight cents. It has one disadvantage, however, and that is, that it has not been made to work successfully on the direct current.

In closing, allow me to mention two or three cases where this white light has served me well. (1) Mrs. D. had been

affected with lupus erythematosus of the face for three or four years. At certain stages the x-rays seemed to aggravate the conditions. I gave her twenty treatments with the result that, to all appearances, she is cured.

(2) Mrs. M., malignant disease of right breast, of three years' standing, has been under x-ray treatment for a year with very great improvement. For the last two months, however, the case seemed to have come to a standstill, the x-ray seemed to have no effect. I gave her two treatments with the white light of twenty minutes each, with the effect that the recuperative process has been awakened with very gratifying results. She is still under treatment.

[Since writing the above, we have had the c. p. of the Nernst lamp tested, and find that a six-glower lamp inclosed in the hood, equals 810 c. p. instead of 500.]

Discussion.

Dr. Henry W. Frauenthal, New York City: I would like to ask Dr. Barrett what was the distance of the light from the patient, the time of exposure in minutes, and how frequently the patient was exposed.

Dr. Thomas W. Brockbank, Philadelphia: The statement of Dr. Barrett that in the case of cancer of the breast there had been first progress, then a period in which the case remained stationary, followed by improvement as the result of the use of the intense white light brings us to the point of the effect of the x-ray upon healthy tissue. I believe that the arrest of improvement is due to the accumulation of dosage. When we have reached the point of the inhibition of the reparatory power of the healthy tissue we have come dangerously near the destructive point of healthy tissue as well as of unhealthy tissue and to the point where the x-ray will do more harm than good. The intense white light used in connection with the x-ray stimulates the normal tissue during the destruction of the pathological condition by the x-ray.

Dr. Barrett (closes): In my practice I use this white light every two or three days to guard against the possibility of the x-ray burn. The distance of the light depends largely upon the sensitivity of the patient. The patient with lupus could bear the light at about three feet. This was gradually

lessened until for the last two minutes of the treatment she could bear it at about eight inches from the face. Other cases will often not bear it nearer than two feet. In frequency, I usually make the applications every other day, the duration is from ten to twenty minutes. In the lupus case I began with twenty-five minutes; then gave but fifteen-minute treatments, and now I am treating with only ten-minute applications.

Dr. C. Am Ende, New York City: I would like to ask the author of the paper whether the bright light has any effect upon the eyes?

Dr. Barrett (replying to Dr. Am Ende): I have used no protection to the eyes, for the reason that the lupus has involved the upper eyelid. I do not see that the light affects the sight of the eye in the least.

Dr. William Benham Snow: In the line of the remarks of the doctor in which he says that there is an opposite effect, I would like to emphasize the fact that if we wish to get inhibiting effect of the x-ray we should not use stimulation of light until we have inhibited sufficiently to secure our object.



FLUID EXTRACT OF SHEEP'S THYROIDS AN AID IN THE TREATMENT OF CANCER.

BY C. AM ENDE, M. D., NEW YORK.

In presenting my second paper upon this subject it should first be stated that its conclusions are derived exclusively from the cases reported below, the special varieties of cancerous disease of which were ascertained by a competent microscopist. No superficial cutaneous cases are included, because of their curability by the Roentgen rays alone; and with one exception all were deep-seated cases.

Concerning the material employed it should be said, that the prolonged use in large doses of this thyroidal fluid extract became possible: (1) through its freedom from those ingredients of the natural gland that cause the severe cardiac disturbances but by raising the blood pressure, especially the intrauterine, it is apt to cause in recurrent uterine cases somewhat persistent hemorrhages but not difficult to check; (2) because there is tendency to induce diarrhea in men, not so noticeable in women, it produces, however, but slight, if any gastric disturbance.

The principal reason for the presentation of this paper is to call attention both to the advantages obtainable from this agent and also to show its limitations.

The result at once appearing in all cases reported below, most obviously in Case 5, is the disappearance of the cachexia. The extract undoubtedly acts as an antibody to the cancer-toxins. The patients soon again regain strength physically and mentally; they resume work in household or business. With renewed hope (if aware of their disease, though this had better be avoided), they again enjoy life, and become exceedingly grateful to their medical attendant. But considerable enfeeblement may be manifested, a diminished power of resistance to injurious extraneous influences, or to dormant internal pathological conditions or processes.

Prolongation of life with full activity should not escape notice. (See Cases 1, 5, and especially 7.)

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Philadelphia, September 21, 1906.

Another, but more obscure, effect is hardly complete, but there is certainly considerable interference with, and obstruction of, propagation through the lymphatics. (In the adducible cases this appears the most marked, as in the early history of Case 1. The non-adducible, by the way, outnumber the former.)

Hand in hand with these goes cessation of pain. As x-rays effect the same to a certain extent, Cases 1 and 5 may be pointed out. For a year the latter patient had contracted the morphine habit by the use of the drug for relief of unceasing intense pains in the arm. Upon their cessation from using the extract with the rays she could voluntarily abandon the habit.

Another result of importance is, that under the combined treatment,—x-rays externally and this fluid extract internally,—all fresh metastatic tumors, that were softer, even some quite large ones, disappeared in a comparatively short time. (See Cases 1, 3, 4, 5, 6, 7.) Treatment and supervision of the patient, however, should not be discontinued too soon.

Affected foci may exist in the neighborhood, or a protected, deep-seated gland or duct may have escaped destruction.

Case 3 first lost ground under x-ray treatment but improved when the thyroid preparation was added. Three cases, one each of epithelioma, carcinoma, and sarcoma selected by Dr. Judd for Dr. R. T. Morris from his clinics, gave the same result.

In Cases 4 and 6 the early institution of this treatment saved the patient at least much greater troubles.

But cancerous masses protected by bones (intracranial, internal thoracic, etc.), as well as old, firm, or nodular growths have so far resisted this treatment.

One of the causes for this would seem to be the liability to burns by administrations of the x-rays with sufficient energy to penetrate the denser structures.

Dr. Geyser's double-tube rectifier may prove of great value, and it is a pleasant duty to state that one case (No. 7) that began to go wrong completely reversed upon its institution. For the present it assumes a favorable turn. It seems that different apparatus give differing results.

It should also be realized that excepting arsenical preparations any other useful drug may be employed simultaneously.

Eimer & Amend of New York supply this fluid extract, as

well as the solid preparation in capsules. The latter, however, does not keep well, it is hygroscopic.

Although the cases described below are few in number, the uniformity of the results as shown, warrant the hope that a conditional favorable prognosis may be given in a series of cases, that have heretofore been declared utterly hopeless by good observers.

This series comprises most post-operative recurrent, and some primary mammary, a portion of similar uterine, and cases not protected by bones. The hyoid bone and thyroid cartilage seem penetrable.

The principal conditions upon which the prognosis, whether favorable or unfavorable, depends, are absence or presence, and accessibility or non-accessibility of metastatic or contiguous infiltrations.

Further improvement in apparatus, and perhaps in technic as well, and possibly too in the administration of medication should strengthen the feeling, acquired by many years of slow but gradual progress, that with increased experience the described limitations may furthermore recede.

Case 1.—Mrs. W. G., *æt.* forty. Hysterectomy in fall of 1900. Recurrence early in 1902. Thyroids in capsules, about one dram daily, were given under the observation of the late Dr. Pryor. The administrations were often interrupted upon cessation of pain or when traveling. Sporadic hemorrhages in June, 1903; continuous from October, 1903, until July, 1904.

After thermocautery by Dr. J. C. Taylor, the patient came under the care of the writer; the cicatrix was eroded with a large mass in the recto-vaginal septum and a smaller one in the vesico-vaginal wall. The patient was for a while too weak to get from a couch upon a table alongside of it. Under local hemostasis by ergot with adrenalin, 80 grains of thyroid daily, and the employment of radium of 7000 radio-activity three times weekly, there was a gradual return of strength. She was able to walk first about the flat, and then out on the street. On September 28 she rode four miles to the office for x-ray treatment, which was substituted in place of radium. There was gradual complete disappearance of the anterior tumor; diminution in size of the posterior so as to admit freer passages; cessation of the hemorrhages. The patient later walked to church, visited friends and theaters. She was

caught in the blizzard of February, 1905, and obliged to walk about 11-4 miles through driving snow, when her clothes became wet and she was thoroughly chilled. A few days later a general peritonitis developed which baffled all efforts and became fatal in ten days.

Case 2.—Mrs. H. K., æt. sixty-six. Hysterectomy October 22, 1901. Scirrhus carcinoma. March, 1904, showed fetid leucorrhea and some hemorrhage. There was also chronic gastritis with gastralgia and locomotion was impossible for more than a city block. The x-rays were forbidden. At first two, and later, four teaspoonfuls of fluid extract, and some solid were given, and she walked, in November, fourteen blocks, and later the entire length of Central Park. Some hemorrhages occurred late in November. Now x-rays were employed. In February, 1905, the ulceration closed and the labia were dry with a cessation of all symptoms. In March she developed a nephritis that became fatal in three months.

Case 3.—Mrs. A. A., æt. fifty-two. Amputation of right breast in November, 1901, for carcinoma. A second operation was performed in May, 1902. The x-rays were employed in the winter of 1903 and 1904, three times weekly at the clinic, but there was a gradual increase of all morbid processes. She came under the care of the writer in February, 1904. There was considerable swelling of the right arm, neck, and face, and some of the tongue; mastication was painful; speech difficult, and mouth and nose dry. The breast was hardened and presented a number of suppurating scabs. There was a chain of indurated glands in the axilla, and the arm was quite immovable. A metastasis developed in the right breast. Under the x-rays employed by the writer, and 200 grains of the solid extract three times weekly, by June there was a complete subsidence of the swelling of the face and neck and considerable diminution also of arm. The pressure symptoms of the seventh nerve disappeared. Also quite free use of the arm; and there was considerable softening of the fleshy parts of the chest and indurations. All scabs were dry, some having healed. The tumor of the left breast continuing to grow, it was amputated. Suspension of all anti-treatment was taken for two months, followed by extended intermissions because of outside discouragement. There was gradual sinking, death following.

Case 4.—Mrs. D. I., æt. forty-two. Amputation of right

breast in 1900. Fibro-myoma; some malignant foci. First seen in February, 1904. Right arm swollen from shoulder to wrist; a smaller tumor at clavicle; a larger, posterior to axillary line from fifth to eighth rib. All yielded under fluid extract and the x-ray, which was not taken regularly. The patient began to travel extensively. Returned November 1 because of bleeding from the left nipple. This flattened and depressed upon the greatly enlarged areolar portion, protruding about one and a half inches. The enlarged breast contained an incipient soft tumor fully three inches in diameter, and a few drops of bright red blood exuded upon pressure. In spite of some further interruptions by traveling, complete restitution of this breast to normal took place by February, 1905. This tumor of the breast recurred in August, 1906, but then yielded to five treatments. The other incipient tumors were gone, but upon return to the city some further protective treatment is to follow.

Case 5.—Mrs. W. E., æt. forty-nine. Amputation of left breast in 1898. Second operation was performed in 1902. Severe x-ray treatment was employed for about one year. She then contracted the morphine habit on account of pain, and was in a most critical condition when first seen by the writer in April, 1904. Through pressure of a rather firmer tumor, extending inward from the anterior third of the left clavicle upon the bronchus, the recurrent laryngeal, the pneumogastric, and phrenic nerves. There was dyspnea, threatening suffocation upon slightest exertion; small and large moist râles. There was nearly complete suspension of the gastric functions with corresponding emaciation and debility. There were peculiar high-pitched and almost incessant eructations, mostly dry, but at times bringing up a bland neutral fluid. There were glandular nodes extending from above the left clavicle and scapula up to the occiput, and a large circular, and smaller sessile hard plaques in the right breast with chains of enlarged glands extending into the axilla and upwards on the neck. The left arm was swollen from the shoulder to the fingers, the first two phalanges inclusive. The skin was tensely expanded with hydropic color and luster but hardly pitting, and excessively painful, especially at the elbow and the circumflex point of the humerus. The cicatrices of the left breast were indurated and firmly adherent, and a

dense network of telangiectases was present over the space from clavicle to the fifth rib and from the sternum to about the nipple line. There was menorrhagia, a fetid leucorrhea, but no albuminuria.

Treatment had to begin with oxygen inhalations for this dyspnea and threatening suffocation; also four tablespoonfuls of the fluid extract daily, continued till October. Under these sufficient improvement had taken place by May 7 to be able to ride four miles to the office for a resumption of proper x-ray treatment, twice weekly. There was early disappearance of the dyspnea so that oxygen could be suspended. There was very slow diminution in the size of the clavicular tumor and of the force, ring, and frequency of the eructations. In July there was a cessation of the menorrhagia with gradual disappearance of the fetor, and nearly complete subsidence of the leucorrhea. The swelling of and pain in the arm decreased sufficiently for the voluntary abandonment of the morphine by October. The gastritis was very obstinate, necessitating the greatest care in diet, but there was still sufficient increase in strength in July to enable her to attend to her household work, and take outdoor exercise, participating in a country excursion. By November the telangiectases were nearly gone and the previously large and smooth clavicular tumor had nearly gone and was outwardly reduced to bean-sized nodules, kernel-like. The plaques in the right breast became mobile and smaller and the râles greatly diminished, although at times there was considerable expectoration, and eructations were rare. Interruption of treatment by a rheumatic attack beginning in October with an abnormally heavy oxaluria, followed by albuminuria with hyaline and granular casts—nephritis, fully developing, ended the life of the poor sufferer a few months later.

Case 6.—Miss P., age about thirty-five. Amputation of the right breast in 1904 for carcinoma. Metastasis, developing in the left breast in 1905, disappeared by treatment upon advice of Dr. Robert T. Morris with the fluid extract and x-rays. On amputation later of the same breast, for safety, only healthy tissue could be found.

Case 7.—Mr. F. J., æt. sixty-two. Right colostomy for complete obstruction in February, 1905. Laparotomy a week later revealed an inoperable adeno-carcinoma of the sigmoid flexure and upper rectum. Prognosis: early fatal issue. Be-

gan April 4 with x-rays by writer at first three times weekly, gradually less often. The fluid extract in doses of at first three tablespoonfuls daily, then two, then one; during the hot weather of 1906 one-half of one. Two secondary tumors, apparently by extension at first; one filling out the iliac fossa; bulging out; the other in the anterior rectal wall. These two have disappeared. The initial proctitis subsided last summer, It reappeared this summer following attempted internal cathaphoresis, but together with some pain disappeared since using Dr. Geyser's rectifier. With employment of Dr. Robert T. Morris' rubber-ball closure last spring, normal passage of all feces. At this writing, September, 1906, the very active patient looks on his wheel, or launch, or sometimes at hard labor, the picture of robust health. Weight 178 pounds, a recent gain of 6. Treatment continues.

319 W. 45th St.



Editorial.

A PROPER RECOGNITION OF PHYSICAL MEASURES IN THE TREATMENT OF NEURITIS.

NEURITIS, too often referred to by authorities as neuralgia, has in the past been one of the banes of the profession; and from the reading of the literary contributions of some of our best known medical authorities it would seem that even now the profession at large is at sea for a means of radically treating this painful neurosis. Not so, however, is it in the hands of the members of the profession who, having learned how to localize the lesion, and therefore not being misled by the referred peripheral pains, are treating with physical measures the local inflammatory process. Those who command a virile method of treatment do not fall back upon rheumatism as a cause or the rheumatic remedies as a screen for inability to cope with the condition.

There is probably no lesion more promptly responsive to the correct treatment than the early diagnosed and localized neuritis, or more stubborn and resisting to an unscientific management. In the very early stages, except in deep-seated involvements, as in the pelvis or chest cavity, the administration of intense radiant light, and heat, or prolonged administrations (four to five hours consecutively) of dry heat, is capable of aborting the process. When, however, the lesion has progressed for a week or so, the product of the inflammatory process has been thrown out into the intercellular spaces and sheath surrounding the lesion; when more energetic measures will be demanded. Probably no agent will so well meet the indication of such cases as the static modalities, associated in chronic cases with the x-ray for promotion of the absorption of the organized exudates. The static wave current and static sparks are capable of curing any uncomplicated case of acute neuritis of not more than two weeks' standing within the period of time that it has been present, in all cases in which the lesion is exterior to the cavities of the body. This effect has been confirmed over and over again in the hands of all those who understand the employment of these measures, and yet many of

the leaders of medical thought still fail to recognize this truth. Those who follow only the therapeutics of climate, drugs, and diet, must be brought to recognize the truth, as to the energetic effects of the physical agents in therapeutics; both for the preservation of the virility and reputation of the profession at large, and especially for the sake of suffering humanity.

* * *

RECOGNITION OF ELECTRO-THERAPEUTICS BY THE MEDICAL PROFESSION.

WE note with satisfaction the step taken by the great British Medical Societies—The Academy of Medicine, and the British Medical Association—in adding sections devoted to Electro-Therapeutics to their departments, the leadership of which has been placed in the hands of men who have been honorably active in the promulgation and advancement of this long neglected department of medical science.

It is to be hoped that this example set by the English members of the profession will not go unobserved and unheeded by the officials of the American Medical Association who to this time have ignored appeals made by the earnest workers for the institution of a section of Electro or Physical Therapeutics.

The broadening spirit of the so-called electro-therapeutists in this country, through the action of the American Electro-Therapeutic Association, the oldest electro-therapeutic organization in the world, is now evident from the fact that it has taken the initial step by instituting the consideration of other physical measures, in its sessions, and by taking steps at the last session to change the name so that it will nominally include the other departments of physical therapeutics.

A section was formed Wednesday evening, March 20, in the New York Academy of Medicine, under the title of the Section of Therapeutics, through the efforts of gentlemen interested in the advancement of physical therapeutics. This step means a still broader conception of the recognition of these valuable therapeutic measures, in the general field of therapeutics, where they properly belong. So also we might consider it possible that the American Medical Association in its Section of Therapeutics might recognize the efforts of the members of the

profession who have devoted their energies to the development of these advanced therapeutic measures. As a matter of fact, however, that section is already so overcrowded with the other therapeutic lines, that little time would be devoted to the progress and consideration of the newer elements in physical therapeutics.

An effort is now on foot, looking to the establishment of a Section of Physical Therapeutics at the next meeting of the American Medical Association, and there should be a concerted action on the part of all who are interested in its accomplishment to further the cause.

* * *

UNIVERSAL PEACE ASSEMBLY.

The general assembly of the International Medical Society for Aid in the Prevention of War was held at Paris, France, on March 21, 1907.

The benevolent work of this institution in arousing the medical profession to the all-absorbing question of "Universal Peace," is deserving of the best efforts of all. It is fitting that the great medical profession should energetically assist in promoting the cause, thereby instilling through its influence the humane sentiment which will help finally to the enduring establishment of an international code which will make it impossible for the nations to brutally war upon each other. Dr. Riviere of Paris deserves great credit for his efforts in awakening the great medical profession, to an organized effort in its behalf.

The American branch of this Society will during the coming years energetically endeavor to enroll a strong contingent allied to the parent body. For particulars address the Secretary, Dr. Geo. Brown, Austell Bldg., Atlanta, Ga.

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EDITORIAL COMMENTS.

The Archives of the Roentgen Ray, which has been so ably edited for the past year by Dr. Clarence E. Wright, will from March 1, be edited by Dr. W. Dean Butcher, M. R. C. S. We trust that the standard of this excellent monthly will be maintained under its new head, and wish him all success in his editorial career.

The second International Congress of Physiotherapy will meet at Rome, October 13-16, 1907, with Prof Guido Bacili as President, and Prof. Carlo Colombo, Via Plina 1, Rome, Italy, as general Secretary, to whom all foreign communications should be addressed; Dr. Francis B. Bishop, as Acting Chairman of the American Committee, and Dr. Wm. Benham Snow, 349 West 57th Street, American Secretary.

We note with interest the energetic effort being made by the Roentgen Society of London, in establishing some standard of measuring radio-activity, both of the x-ray and radio-active substances. The personnel of the members of the Committee is a guarantee that this difficult task is in hands that will accomplish the task, if possible. Communications should be directed to W. Dean Butcher, M. R. C. S., or Ph. Mulholland, M. D., Honorary Secretaries.

The British Electro-Therapeutic Society is to be absorbed in the British Academy of Medicine.

At the next meeting of the British Medical Association there will be an electrical section established before which Prof. Stephen Leduc has promised to deliver an address at the opening session. The meeting will be held on July 29, and the following days. The officers of the section will be as follows: President, H. Lewis Jones, M. D., London; Vice-Presidents, J. D. Pratt, L. D., Exeter; R. C. Lyster, M. R. C. S., London; W. C. Wilson, M. D., Plymouth; Honorary Secretaries Ellis, Pearson, F. R. C. S. E., Bideford; E. W. H. Shenton, W. R. C. S., 126 Holly Street, London, W. The programme will be divided as follows: Electro-diagnosis and Radiology one day, Radiotherapeutics another, and Electro-Therapeutics the third. The English fraternity extend a cordial invitation to the American and foreign brethren to attend the meeting, where they are assured a cordial welcome.

The Archives of Physiological Therapeutics has been merged in the Quarterly Journal of Inebriety, edited by Dr. Cruthers. We wish Dr. Cruthers success in this addition to his valuable publication.

Progress in Physical Therapeutics.

CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL.

EDITED BY WALTER H. WHITE, M. D.

The High-Frequency Currents in Chronic Rheumatism and Rheumatoid Arthritis. By G. E. Pfahler, M. D., Pennsylvania State Medical Journal.

The writer states that electricity in one form or another has been used in the treatment of affections in question, since the beginning of its use in medicine. He confines his treatment, however, to the use of high-frequency and high-potential currents, those having oscillations running as high as one million per second. He states that the current which he has employed is from an Oudin resonator attached to a Ruhmkorff coil. In considering the subject he states that the definite causes of chronic rheumatism and rheumatoid arthritis are not known, but are probably due to failing metabolism, and assumes since the high-frequency currents seem to stimulate metabolism both local and general, they would be indicated. His methods of treatment have been to place the patient upon a chair or couch of wood (and therefore a bad conductor), and without direct electrical connection, with an electrode held in the hand, another wire coming directly from the resonator attached to a vacuum electrode which is moved over the affected joints or muscles to the extent of inducing a distinct erythema. By this means he states that several effects are produced as the currents passing through the body have (1) a constitutional effect, usually raising arterial tension, and increasing tissue change; (2) locally, counter-irritation is induced, by the multiple sparks from the glass electrode, which may be varied by the distance which the electrode is held from the skin. To this is added (3) the actinic effects of the electrode discharges.

He reports the case of a female fifty-eight years of age, whose sister had rheumatoid arthritis, and who gave a history of several mild attacks of painful joint. About a year and a half ago, her right shoulder became painful, and on November 19, 1904, the movement was very much limited. Pain and rigidity in the left shoulder and right hand, with considerable redness of the hypotenar eminences. Treatment was given

three times weekly, and then twice a week. After the first two treatments there was relief of pain, which later disappeared entirely. The parts became more mobile, and at the end of four months she could reach up and pin her hat. At the end of six months her right shoulder was perfectly free. She has since had occasional pains in the knee and feet. A few treatments were sufficient to relieve this. In chronic rheumatism there was relief of pain and stiffness. The writer believes that massage or mechanical vibra-massage and passive motion should be added, because they also aid to increase local metabolism. He believes in the treatment of rheumatoid arthritis the x-ray is generally more satisfactory, but it is likely that certain cases will do better by a combination of these methods.

The X-ray and High-Frequency Currents in the Treatment of Certain Diseases of the Eye and Ear. By Dr. H. O. Wells, in the *Electro-Therapeutist*, January, 1907.

The writer considers the x-ray and high-frequency currents as almost indispensable in treating diseases of the eye and ear. He calls attention to the fact that oculists are generally slow to recognize their value. The diseases in which he considers these agents most popular are trachoma, iritis, blepharitis, keratitis, and diplopia. In trachoma, the X-ray has been successful and with astonishing ease and rapidity, the same being true in a case of blepharitis marginalis. He places a low vacuum tube at a distance at which the bones of the hand can be plainly seen, and makes the exposure for three minutes, judging of the quality of the light by the fluorescence in a dark room. The application is made with the eyes closed, the eyebrows and hair being protected with lead foil. He employs the ray until there is an appearance of a slight conjunctivitis, which is sufficient to effect a cure in all cases of trachoma. He has also used the high-frequency currents applied directly to the affected surface, but considers it too painful and impracticable, especially in children, while the x-ray obtains the desired results without this objectionable feature.

In iritis he has not seen a case that was not favorably affected by the use of the high-frequency currents; it both alleviating the pain and reducing the inflammation. He refers to one case, which he diagnosed as rheumatic iritis, in which the pain had been so severe, that the patient had not slept for two nights. The high-frequency current was applied, with a flat vacuum surface tube, the electrode was attached to the negative pole of the machine, over the closed lid. The relief from pain was so complete, that she fell asleep while taking treatment, and the recovery from the attack was rapid. She had been

subject to recurrent attacks; but since this treatment has had no recurrence. He calls attention to the fact that atropine for dilating the pupil, and other antiphlogistic treatment may be employed in conjunction with the high-frequency current. He makes the application both over the eyeball and around the orbit, especially to the temporal side, for the relief of pain. In earache and neuralgia he had found the high-frequency currents a desirable treatment for the alleviation of pain. He places the electrode over the mastoid, or applied through a roll of wet cotton-placed in the auditory canal, one end of which was against the ear-drum, and the other at the meatus. The writer has had good success in cases in which we are apt to ignore their use, and turn the case over to the eye or ear specialist. These suggestions, if followed, will enable the man who is equipped to treat some of these obstinate cases, and add laurels to the field of electro-therapeutics.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Practical X-ray Therapy. By Nobel M. Edenhart, M. D., The Medical Standard, November, 1906.

The writer has had good results in acne rosacea with x-ray and like Gautier and Hahn believes that, properly used, it is a very valuable agent. He employs a lead mask with openings of various sizes to suit lesions, and uses a medium tube at six inch distance from the surface for about five minutes on alternate days until a dermatitis appears. His idea is that a slight not a marked dermatitis is desirable. He considers the x-ray to be of very great advantage in the treatment of actinomycosis but frequently should be associated with electrolysis.

Alopecia areata can be frequently relieved by radiotherapy, a slight stimulating administration causing a new growth of hair to appear, which in many cases is all that is desired. He uses a medium or moderately high tube and makes from five to ten minute exposures. He also uses the x-ray in conjunction with the iodide of potash in the treatment of *blastomycosis*.

The Value of the Roentgen Rays as a Therapeutic Agent.

By G. E. Pfahler, M. D., The Pennsylvania Medical Journal.

In this paper he calls special attention to the x-ray in the treatment of chronic diseases and refers to the stereotyped

expression, "since everything else has failed let us try the Roentgen rays." He mentions the treatment of many conditions, among them "hypertrichosis," which he has treated with success with this agent. He admits that there may be an occasional recurrence and that it may be necessary frequently to remove a growth of hair two or three times. On account of danger of atrophy of the skin, he states that only severe cases should be treated by this method. He states, however, that there is probably no better method in these cases, as atrophy does not occur in all cases, and a slight atrophy is preferable to an extensive growth of hair.

Acne vulgaris.—In these cases we get uniformly good results and make grateful patients. The papules and pustules disappear and even the scars fade to considerable extent. The rays lessen the tendency to the production of pus in the skin, cause an atrophy of the glands of the skin and in this way effect a cure. He gets equally good results in *acne rosacea*. Cases in which the nose is enlarged with increased vascularity, and dilated blood vessels not relieved by x-ray treatment, should be followed by electrolysis.

Chronic eczema heals very satisfactorily. Sometimes the itching is relieved by the first treatment, but in others it disappears only with the disease, which may require three months' treatment.

Psoriasis.—This affection requires from six to twelve treatments and can be counted on to disappear in about two months and, if it recurs, can again be made to disappear again with x-ray treatment.

Lupus vulgaris.—Most cases of this disease will yield to the x-ray. Cases will vary in the period of treatment required, but most of them can be cured by perseverance, and the permanency and cosmetic results surpass other methods. As a rule the treatment must be carried to the point of producing a slight dermatitis.

Tubercular ulcers will usually yield to the rays when all other methods have failed.

Tubercular glands.—The Roentgen treatment should be the method selected in the cases in which there is no sloughing. If suppuration has taken place the glands should be enucleated by surgical methods and should then be subjected to x-ray treatment.

Epithelioma.—In these cases above all others have the x-rays demonstrated their value. The result in many cases has been no less than wonderful. In practically all cases of epithelioma, if the cases are treated early the rays will cause a disappearance of the growth without pain and often without a scar. As to permanency he states that he has never heard of nor seen a case of recurrence when treated early, i. e., before

the deeper tissues had been involved, and he recommends that it is the duty of the physician to treat all cases first with the rays and not to wait until other methods have been tried and found wanting. In the latest stages we often obtain good results, but the chances are materially lessened by delay and the treatment required is infinitely increased. The small epithelioma should yield in from three to twelve treatments, while later the time required will be very indefinite and there will be much greater tendency to recurrence.

Carcinoma of the breast.—Comparatively few cases of primary carcinoma of the breast he states have been treated by the x-ray, and the majority of those have been inoperable or in patients who have absolutely refused operation. He gives a personal experience with five cases. Three of these were seventy-four, seventy-nine, and eighty-four years of age respectively. Three had heart disease. Two of them have now been symptomatically cured for years. The tumor mass seems in these to have been partially replaced by fibrous tissue. Another patient had had repeated hemorrhages and was not expected to live over three months when the treatment was begun. She lived three years and then died of pneumonia. The fourth patient, a woman forty-two years of age, refused operation and has now been well for three years. The fifth woman, fifty-five years of age, had absolutely refused operation and is still under treatment with every indication of recovery. He thinks the results to date in these five cases will compare favorably with those obtained with any other method. He always recommends operation where it is at all practicable, but he reserves the right to change his views in the near future if he thinks best.

Secondary carcinoma of the breast.—He believes that the chances are good in these cases, if referred early. The longer the recurrence is allowed to grow, the less the chances of recovery. In these cases no other method of treatment will compare. It is a great satisfaction to see the nodules melt away and leave no trace behind. He reports cases of recurrent carcinoma of the breast that have been well for years.

Post-operative treatment for carcinoma of the breast he believes to be the ideal method of treatment, basing his opinion on theory more than on absolute experience. While operative treatment may not prevent recurrence in all cases, he feels that in all cases of carcinoma of the breast post-operative treatment is indicated.

“What will be the result with a particular patient under consideration?” He thinks the only way to get at this should be a consultation with the family physician, who is supposed to watch the case and who is supposed to have a knowledge of the length of time it has existed, its activity, and its virulence,

from which the Roentgenologist is to base his conclusions, depending upon his experience in similar cases and his knowledge of the principles of Roentgen-therapy.

"How shall the patient obtain this treatment?" This is a rather difficult question to answer, but he thinks the patient should be referred to a careful and competent Roentgenologist, who has had a wide experience in Roentgen therapy and not a man who simply has an "x-ray machine." He believes but few general practitioners or surgeons are competent to get the best results from the Roentgen rays. The requirements of their general work will not allow them time and opportunity to keep up with the most modern technic. Neither can a man afford to keep up a modern equipment, who for its support depends upon an occasional case; for the rays are capable of much harm and are to be looked upon no longer as a anything.

Results in Roentgen Therapy. By Charles Lester Leonard, M. D., Pennsylvania Medical Journal.

In this paper the writer deals with the history of Roentgen therapy, in which he calls attention to the reports of many failures and successes obtained with this method of treatment. He states that in the hands of hospital students and inexperienced physicians, either as a diagnostic or therapeutic agent, the x-ray is a very dangerous as well as an inaccurate agent and quotes Edsall, who also says of it, "It is undoubtedly the most violent known of the therapeutic agencies, and this demonstrates both great possibilities for good and great potentialities for harm." This warning, given out by Edsall as a result of his investigation into the effects of this agent on metabolism, has frequently been misquoted to mean that the Roentgen ray applications are always dangerous and that more than ordinary care should be used in recommending their employment. The danger he sees and desires to call attention to is in cases where the excretory and eliminative organs are diseased and incapable of caring for the products of increased metabolism resulting from a Roentgen treatment. His observations have shown, "One exposure even may double the metabolic output in the next few hours; clearly, the necessity for metabolizing and excreting such an amount of destroyed tissue must be dangerous in a good many instances."

The cases cited by Edsall are chiefly those of arthritic and gouty subjects in whom the excretory and metabolic functions are commonly disordered. He reports an illustration of such a case,—the case of the wife of a prominent physician, who had been suffering for years with a painful and gouty condition of the jaws with loosened and tender teeth, precluding the

use of solid food. Three mild treatments resulted in uric acid crises, which put her in bed. When she recovered the tenderness of the teeth had nearly gone and a few careful treatments sufficed to effect a cure. He has had similar results in other conditions of neuralgia in which he has used the Roentgen ray for relief. While not always successful, he has been able to relieve many cases of tic, migraine, and persistent neuritis when due to faulty metabolism. In regard to malignant and glandular disease, he calls attention to the degree of susceptibility of various structures, first, that the lymphadenoid tissues of low vitality are first affected by the ray. Also, that in cases of tubercular adenitis and malignant mammary diseases, when under treatment by the x-rays, previous to operation, the lymphatic channels are found to be converted into solid cords and that these cords render operation more difficult. He believes that these lymphatic channels, made "into solid cords" cause a complete isolation of the foci of the disease and a destruction of the paths throughout which metastasis is most liable to take place. This, he thinks, is absolute proof of the value of anti-operative treatment in malignant disease as a preparatory measure. He thinks that far advanced cases should be treated for the palliative effects, as it relieves pain and thereby makes the patient more comfortable.

X-Rays in Tuberculosis. New York Med. Jour., February 6, 1907.

McCollough attempts to demonstrate that the mechanism of the therapeutics of x-rays rests upon the induction of an auto-vaccination subsequent to the resolvent action of the x-rays upon the rudimentary neoplastic encapsulated tissues with the tuberculous glands, thus rendering the vaccine accessible to the blood stream. "Its effects may be shown by minute temperature reactions accompanied by similar advances in the opsonic index without negative phases, tested by the periodic estimation of the opsonic index to the tubercular bacilli."

This will be seen to be identical in theory with the paper "Tubercular Antitoxin," read by the associate editor before the American Electro-Therapeutic Association in September last. In that paper, while I had been unsuccessful in having the opsonic index thoroughly tested following the x-ray treatment for tuberculosis pulmonalis, I was satisfied that it could be demonstrated and I am delighted to know that Dr. McCollough has succeeded in verifying it. We hope later to be able to present a more complete abstract of this paper.

A Régime of Two and One-Half Years' Experience in the Treatment of Skin Diseases by the X-Ray. By Geo. D. Bond, M. D., Texas State Journal of Medicine.

He states that most cancers located in the skin can be cured probably better than with the knife or caustic, especially cases about the face and head. In cases involving the lower lip he thinks that the knife should be used first, followed with the x-ray. In the treatment of non-malignant forms of skin disease the writer has been uniformly successful, and states that he is impelled to make this early report not from his own results alone, but says they are corroborated by those having larger experience and opportunities. He makes an appeal for the organization of a section devoted to physical therapeutics in the National and State Associations and says "if it were possible, great help would be given to the work and a material branch of medicine become recognized. He refers to Hare's statement in his latest edition of his work on *Materia Medica*, in which he says that "electro-therapeutics is of such importance that it should be treated by the specialists in that line," and for that reason, only, he omits otherwise mentioning it in his work. He also quotes a statement made by Hare before his class at the Jefferson Medical College, in which he stated that as they grew older, they would pay more attention to physical methods, and less to drugs. Among the cases reported, he includes a case of eczema of several years' standing in a boy eight years old, which during this time had been unsuccessfully treated by several physicians. The case was a very aggravated one, his legs and arms being kept bandaged to protect them from being scratched. After the third treatment all itching ceased and there was a gradual disappearance of the lesion, and at the end of three months the skin was normal. Since then, every three or four months, a patch comes out on the body. These have required from three to six treatments. He has treated in all eighteen cases of this character, the ages of the patients ranging from one year to sixty-five years, the duration of the disease from two weeks to twenty years. Treatments varied from two applications on alternate days to six months. Six were dismissed cured two years ago, and others at intervals since. All have been kept under observation, and in none has there been a relapse. He gives the history of one case of *epithelioma* in a woman sixty-five years of age. The lesion was located on the face and was one inch in diameter, circular, and raised about 1-16 inch above the surrounding tissues, discharging rather freely, and causing severe pain and discomfort. After the third treatment pain ceased and there was considerable improvement, but in the appearance of the lesion for the two following weeks there was little farther change in the condition. The tube was

placed a little nearer and finally a mild dermatitis was induced, after which the improvement was continuous. At the end of two months all signs of the lesion had disappeared. The writer has since treated nine similar cases, many of them more severe than the one described. All these cases were treated by the same method as the first, the tube being placed close enough to produce a slight dermatitis in two weeks, and all but one of them was benefited from the first. Relief of pain in one case, followed the first treatment. In all others, none suffered pain after the fourth treatment. All improved after the treatment and six continued to until the lesion disappeared. Two of these cases have remained well for two years. Two others dismissed since are still well, and two were lost sight of. Of those not cured, two ceased treatment after relief from pain, and decided improvement of appearances, and have been lost sight of. The other case was one involving 1-3 of the lower lip and chin; one month's treatment having failed to show improvement.

Of *acne*, seven cases are reported. The writer's experience has been very satisfactory. He finds it is necessary to push all cases to a slight erythema, to obtain the happy result.

Leucoderma.—The patient had white spots covering her chin and parts of her lips, and spots on both hands, which had been present from two to eight months, before treatment. On the face, the pigment returned completely after one month's treatment; to the hands, more slowly. Two spots made no improvement—the spots of longest standing; results satisfactory.

Sycosis.—Three cases, all barber-shop infections, all cured in from six days to two weeks. All other treatment had failed.

Carbuncle.—One case treated, rayed twice, and opened with incision one inch long, and a large amount of cheesy-looking stuff evacuated, and thoroughly washed out with sterilized hot water. The case recovered rapidly. The pain, which was severe, was relieved after the first treatment and the generally accompanying distressing pains were entirely lacking.

Hyperidrosis, of the feet and hands, have been quickly relieved, requiring from four to ten treatments. Some cases relapse, requiring subsequent treatment. Of the six cases, four, however, remained well after more than twelve months.

The writer concludes his paper by stating that the worry has been greater than the work in obtaining these successful results, on account of the published bugaboos with reference to the dangers. The public, however, are becoming convinced that in skilled hands the dangers are small, and knowledge of the principles of treatment places it in the same position as other therapeutic measures. He states that he never treats cases under any circumstances oftener than every other day,

and no longer than for fifteen minutes. He also places considerable stress on the variation and quality of the tube. He disparages the use of ointments especially those containing carbolic acid in the treatment of dermatitis, but substitutes sterilized water with sodium bicarbonate added. In sycosis, and hyperidrosis, and acnes, he tries to induce the milder erythema, following which there is a prompt subsidence of the disease process.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

The Treatment of Cardiac Dilatation in Pulmonary Tuberculosis by means of Artificial Nauheim Baths.

George W. Morris (American Medicine, February, 1907) says that he has become convinced that as a certain number of cases of tuberculosis failed to respond to the usual treatment mainly on account of heart weakness, he determined to try the Nauheim Baths in those cases in which there was a demonstrated cardiac dilatation, and in which the lung involvement was relatively slight. Two patients were selected and the baths given in four different strengths, ranging from sodium chlorid 4 pounds, calcium chlorid 6 ounces, to sodium chlorid 7 pounds, calcium chlorid 10 ounces, sodium bicarbonate 1 pound, hydrochloric acid 12 to 20 ounces. The first bath was administered at a neutral temperature of 95° F. and four minutes' duration. Twenty-one baths were given in all, the strength of the baths being gradually increased and the duration prolonged until the last bath was administered at a temperature of 80° F., duration twenty minutes.

The patients were required to rest for half an hour before and one hour after the baths. The temperature chart showed a gradual and steady decline, as did the pulse rate, which was accompanied by an increase in volume. The results were excellent in that the cardiac dilatation was lessened, the pulse decreased, and weight gained. There was a well-marked diminution of cardiac dullness. He concludes that it would seem therefore, even allowing for optimistic enthusiasm, that the baths are a valuable adjunct in the treatment of pulmonary tuberculosis in cases in which there is cardiac weakness, resulting from dilatation."

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Opsonins and their Utility in Practical Medicine.

Herbert French in the British Medical Journal for February 2, 1907, discusses the practical value of opsonins in diagnosis and therapy. His article is practically a review of previous work in this field. In cases of suspected tuberculosis, an opsonic index below 0.7, or above 1.3 is a strong argument in favor of the disease being present. Also, a negative phase continuing for a week following the injection of Tuberculin-R, 1-5000 mg., is very strong evidence in favor of the existence of a tuberculous lesion. In the treatment of tuberculosis by raising the opsonic index through injections of tuberculin, he emphasizes the importance of frequent determinations of the index. For while the usual course is a fall in the index for about a week, followed by a rise reaching its maximum at the end of another three weeks, yet individual cases vary from this considerably. As it is of the utmost importance to obtain the best results that succeeding injections be given at a time when the index is highest, its frequent determination is essential. He also emphasizes the necessity of small injections that the negative phase may not be too marked or too prolonged.

An Improved Technique for Tuberculo-Opsonic Preparations.

A. P. Ohlmacher (American Medicine, February, 1907), describes a different method from that usually employed for the fixing and staining specimens of blood prior to their examination to determine the opsonic index. He employs carbolfuchsin, staining and decolorizing in the usual manner, and employs as a counter stain, a solution of toluidin blue for the nuclei, and a weak eosin solution for the protoplasm of the neutrophile leucocytes. The film is fixed with 95 per cent. alcohol, which, after drainage, is ignited and allowed to burn off. An ordinary smooth slide is used. The points claimed in favor of this procedure are: lack of the necessity of an especially roughened slide, certainty of fixation, and sharpness in contrast for the tubercle bacilli.

Koch's Emulsion of Tubercle Bacilli in the Diagnosis of Incipient Thoracic Tuberculosis.

Wm. Meyer (Med. Record, February 23, 1907), gives a series of 28 cases in which reactions were obtained. The

procedure was employed in cases which gave both typical and atypical histories, and in cases which gave fine râles at an apex. The doses employed varied from 0.005 mg. to 0.01 mg. No ill effects are reported from its use. He considers it of decided value in determining an early tuberculosis. No investigations were made of the effects of these large doses, in some cases repeated, upon the opsonic index of the patient.

Spontaneous Arterio-Sclerosis of the Aorta (Atheroma) in a Rabbit.

W. Ophüls (Jour. A. M. A., January 26, 1907), describes a case of this affection occurring in an apparently healthy rabbit, which had never been the subject of experimentation. He notes a decided difference between this type of sclerosis and that produced by adrenalin injections.

The Action of Pituitary Extracts upon the Kidney.

Schäfer and Herring (Philosophical Transactions of the Royal Society of London, Series B., vol. cxcix), describe a substance, extracted from the infundibular part of the pituitary body, which has a marked diuretic action. This substance, like the active agent in the suprarenal extract, cannot be obtained from the epithelial and more obviously portion of the organ, but only from that part of neuro-ectodermic origin. It is soluble in water and is not destroyed by boiling. It is very potent. It acts specifically upon the kidney, causing a dilatation of the renal blood vessels and an increase of the secretion of the tubules.

PSYCHO-THERAPY.

EDITED BY LESLIE MEACHAM, M. D.

The Bearing of Philosophy on Psychiatry. James J. Putnam, Professor Nervous Diseases, Harvard University. Read before the Section of Psychology at the Toronto Meeting of the British Medical Association, St. Louis Medical Review, January 26, 1907.

Through a study of philosophy it is possible to acquire lofty conceptions of the significance of conscious effort, the value of human life, the meaning of loyalty and obligations such as form much of the basis of religious ethics and in some

respects transcend it. Through them each man is treated as a free responsible creator of better order in the world. Further it helps to better understanding of the origin of mental symptoms, and helps to dispel the embarrassing mystery which shrouds the relationship between consciousness and the external world. Quoting from Kronthal, he sums up, "Must the physician, just because he acknowledges the value of the methods and conceptions of the naturalist, discard the methods and conceptions of the philosopher, and have the latter no bearing on the interpretation of and treatment of disease?" The psychiatrist cannot answer this question in the affirmative.

The aims and the methods of philosophy accentuate the fact that no man can be properly studied except in relation to the community and the world. As each one of his organs is dependent for its activity upon the rest, so is he dependent for the color and movement of his thoughts on those about him.

Insanity in most of its characteristics is a social concept. No behavior of a maniac or a dement could be so wild as not to find its counterpart in acts that have the right, in other social states, to be dominated health, and the decision rests on social arguments.

As it is imperative that we should gain clearer views about those relations of our consciousness that bind us to the conscious lives of other men, so, too, it is essential that we should better understand the nature of the tie between consciousness and the physical world, the brain. Here logical and philosophical inquiry has long since made conditions clear, to which physicians usually close their eyes. In every act of life, every time we eat to "fortify the spirit," as we say, we tacitly admit that consciousness and physical processes are in some sense identical. Yet as constantly we verbally deny that it is so.

It seems to me that psychiatrists cannot properly comprehend or adequately help their patients without some adequate knowledge of the methods and data of philosophy, and that the time is a fitting one for such a step. It is a time when our very respect for the splendid achievements of the physical sciences should make us ready to admit that these sciences are human devices and deal after all, with abstractions, not with the realities of conscious life. This task is one for the philosopher, for the man of common sense and for the psychiatrist.

BOOK REVIEWS.

PLASTER OF PARIS AND HOW TO USE IT. By MARTIN W. WARE, M. D., Adjunct Attending Surgeon, Mount Sinai Hospital; Surgeon to the Good Samaritan Dispensary; Instructor in Surgery, New York Post Graduate Medical School. 12mo, 72 illustrations, about 100 pages. Surgery Publishing Co., 92 William Street, New York City, Cloth, \$1.00.

This is a book that supplies a general demand for information on a subject of vital interest to the surgeon and general practitioner. The subject is treated explicitly, practically, and comprehensively. It includes a consideration of the Plaster of Paris Bandage, The Application of the Plaster of Paris Bandage to Individual Fractures, Fractures of Both Extremities, Molded Plaster of Paris splints, Plaster of Paris in Orthopedic Surgery and in Dental Surgery. It is a volume of 88 pages and has 72 illustrations. It is well bound in red buckram, and creditable in every way.

THE PRACTITIONER'S MEDICAL DICTIONARY. An Illustrated Dictionary of Medicine and Allied Subjects, Including all the Words and Phrases Generally used in Medicine, with Their Proper Pronunciation, Derivation, and Definition. By GEORGE M. GOULD, A. M., M. D., author of "An Illustrated Dictionary of Medicine, Biology, and Allied Sciences," "The Student's Medical Dictionary," "30,000 Medical Words Pronounced and Defined," "Biographic Clinics," "The Meaning and Method of Life," "Borderland Studies," etc.; Editor of "American Medicine." With 388 Illustrations. Octavo; xvi+1043 pages. Flexible leather, gilt edges, rounded corners, \$5.00; with thumb index, \$6.00 net. P. Blakiston's Son & Co., Publishers, 1012 Walnut Street, Philadelphia.

This new work, having the authorship of the well-known medical dictionary which had already been through several editions, has for such reason a guarantee of its excellence. This work contains numerous features which commend it to the profession as an entirely new work. It is in every respect up-to-date. It contains tables of signs and abbreviations used in general medicine and the specialties. Another feature, which will be appreciated by those who are not familiar with all the words, is the syllabication and accentuation which greatly assist in correct pronunciation. The volume comprises 1043 + xvi pages, and has 388 illustrations. It is printed on very thin, tough paper. It is remarkable how so much is contained in such small space. The volume is leather bound, with rounded edges and will lay open at any page. We cordially

commend this work to the profession as one of surpassing excellence in all its features.

THE TREATMENT OF TABETIC ATAXIA BY MEANS OF SYSTEMATIC EXERCISE. AN EXPOSITION OF THE PRINCIPLES AND PRACTICE OF COMPENSATORY MOVEMENT TREATMENT. By Dr. H. S. FRANKEL, Medical Superintendent of the Sanitarium "Freihof" in Heiden (Switzerland). Only authorized English edition, Translated and Edited by L. FREYBERGER, M. D. (Vienna) M. R. C. P. London, M. R. C. S. England; Honorary Physician to the St. Pancras and Northern Dispensary; Pathologist to the Great Northern Central Hospital; Late Clinical Assistant to the Hospital for Sick Children, Great Ormond Street, etc., etc., etc. With 132 Illustrations. London: Rehman (Limited), 129 Shaftesbury Avenue, Cambridge Circus, W. C., 1902. Price, \$3.00 net.

This valuable work fully explains Dr. Frankel's system of successful treatment of the ataxia of tabes by systematic and graded exercise. He lays great stress upon practice,—the repetition of movements. A point in its favor is that the method requires but little apparatus, and that the treatment can be given at the patient's house. The volume comprises two parts—I. General Part, including a consideration of Tabetic Ataxia, the Examination of Sensibility for Ataxia and for Muscular Hypotonia, the Relation Between Loss of Sensibility and Ataxia, and the Theory of Tabetic Ataxia. II. Special Part: The Practice of Movements, Exercise as a Means of Compensating Loss of Co-ordination, and the Mechanism of the Movements of the Human Body; Conditions Influencing the Treatment, Dress, Practice-Rooms; and Apparatus; Classification of Exercises and Directions as to Use, the Examination for Ataxia of the Upper Limbs, the Treatments of the Upper Limbs, Apparatus for the Upper Limbs, and the Consideration of Hypotonia, Preataxia Stages, Treatment of Muscles of the Eyeball, and Paresis of the Larynx and Bladder.

The treatment is one that can be recommended, but the methods set forth should be most guardedly followed. It is written in a concise manner, and is fully illustrated. The work should be in the hands of the general practitioner as well as the neurologist and orthopedist. The volume is well bound and printed, illustrated with clear cuts, and produced in the publisher's characteristic style.

SOCIETY MEETINGS.**SIXTEENTH ANNUAL MEETING OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.**

SESSION OF WEDNESDAY AFTERNOON, SEPTEMBER 19, AT THE
ONCOLOGIC HOSPITAL.

Remarks by Mayor Weaver.

It gave me great pleasure to welcome you yesterday as delegates. I did not expect to welcome you again to-day, having intended that as a permanent welcome. I am glad, however, to welcome you again to-day at this Hospital which supplies such a need to this community. I hope to see the time when the present building shall be changed to a handsome new hospital when it may be possible to attend to a greatly increased number of cases.

Of course, I am greatly interested in the science of medicine. An acquaintance of mine said he was surprised to find a man who knew so much about the subject as I *appeared* to know,—I do not know that he put the emphasis exactly as I have done. I told him that I had been practicing law for some fifteen years and that a lawyer is supposed to know a little about everything. I have tried a great many cases that involved the doctor,—that is, in his support of one of the parties. As District Attorney there has been ample opportunity for becoming familiar with things pertaining to medicine.

I am delighted that the invitation to a ride on the River has been accepted. I wish I could make your stay in Philadelphia as pleasant as you could desire it to be. There are some people who claim to be able to read the thoughts of men and women. I have always had my doubts of such ability. I do not feel that I shall be able to read your thoughts, but I shall have to ask you to let me know in what way I can serve you while in the City of Philadelphia.

**CLINICAL DEMONSTRATION OF THE CATAPHORIC OPERATION FOR
CANCER.**

Dr. G. Betton Massey gave this demonstration in the Operating Room of the Hospital.

The case was that of an epithelioma of the skin and subdermis tissues of the left side of the face, beneath the eye, in a woman of seventy-two years of age. The growth was about

the size of a silver dollar, impinging closely on the lower lid and edge of nose, and had been growing larger for eight years, the last six months rapidly.

The patient was placed under chloroform, lying on a large kaolin pad, beneath which was the negative plate; six zinc-mercury needles connected with the positive pole of the constant current were inserted just within the periphery of the growth, and a current of the final strength of 400 milliamperes turned on gradually. This current was maintained for twenty minutes, at the expiration of which time the whole growth appeared to be changed into a grayish-white necrosis.

CLINICAL DEMONSTRATION OF RADIOTHERAPEUTIC RESULTS IN
CANCER. BY DR. WILLIAM S. NEWCOMET.

Case 1.—A young girl, who when three months old contracted trachoma and from that time she was absolutely blind. About three years ago I began treatment upon the eye, which is now in good condition. After this result I began treating the left eye. The appearance of the eyes was as if there was stretched across them a piece of chamois skin. The mother of the child assumed all risk of any possible further damage. This, however, could only be in the matter of pain, as she was already blind. We now have, fortunately, a good eye with which she is able to see.

Case 2.—A case of erythema-nodosum, showing scars of former methods. The case came for treatment in the middle of July for treatment of the second attack, which we are getting rid of without scar. The original attack occurred fifteen years ago.

Case 3.—Recurrent carcinoma of the breast. We are giving her now and then a little penetration treatment which is prophylactic.

Case 4.—Sarcoma in the neck. This case is one particularly interesting. Two years ago there was the first operation for sarcoma in the neck. This promptly recurred but promptly disappeared under x-ray treatment. A second operation was done in December of the same year, the tumor having recurred in spite of the x-ray and grew to large proportions, until we started the methods of the deep treatment. The patient has been receiving an average of one hour of x-ray treatment very nearly every day by this method. There has been little burning, yet the tumor has disappeared from a large mass to a comparatively small one. When I started the treatment last month the swelling was out even with the chin and with a cuff around over the trachea.

For this method of treatment I have devised a plan by which I can treat four cases at one time. The x-ray tube is

placed in the center of the box having four openings and it can be changed in its position to meet the requirements of the various cases placed in position before the openings. Shields of varying sizes are used. If there is occasion for privacy screens are also used. Leather is used over the openings in the deep cases. On these I do not use the bare x-ray. When treating deep sarcoma or carcinoma of the abdomen I think it is well to use some protection. The results are just as good. We could not possibly use for one hour the x-rays from the tube unless some material intervened without producing a terrific dermatitis and deep ulcer, but by placing a simple piece of leather in the path we are able to keep away the surface ray and cause absolutely no dermatitis. I vary the vacuum of the tube according to the cases treated. The Queens tube can be readily regulated and is ideal in its use.

SESSION OF THURSDAY AFTERNOON, SEPTEMBER 20, HELD IN THE CLINICAL AMPHITHEATRE OF THE MEDICO-CHIRURGICAL HOSPITAL.

The president in the chair.

Introduction of Professor Houston by President Walton.

On behalf of the Board of Trustees of the Medico-Chirurgical College we have selected one of your craft to welcome you upon this occasion. It is with much pleasure that I present to you Professor Houston.

Address of Welcome by Professor Houston.

It is my pleasant duty to welcome you in the name of the Medico-Chirurgical College to their building.

It has been my good fortune to study and follow somewhat closely the progress of electro-therapeutics. You are aware, gentlemen, that this form of therapeutics no longer bears the odium of a false science. It has taken its place as one of the fixed sciences. I think, however, that you will probably all agree that in the high-frequency currents there is much yet to be learned, that a careful study must be made of their physics, with an analysis of their spectrum distribution, that is, their frequency and the different action which rays of different frequency exert upon the human body. There is also a necessity for ascertaining the heating effect. Then, too, there is the difficult problem of the exact path of the high-frequency current through the human body. We should not ever lose sight of the fact that in these rays there are undoubtedly present split atoms, so that the rays manifest the property of radio-activity. The electrons therefore present a matter of vital importance in the employment of the rays.

Remarks by Mayor Weaver.

Mr. President, Ladies and Gentlemen: I have already had the pleasure of speaking to your society; I have forgotten to keep count of the number of time, but this is surely the third time, and I am reminded of the story of the Irishman who was dying and sent for the good priest to perform the rites. The priest stood at his bedside and said, "Are you now ready to renounce the devil and all his works?" Pat looked up at him and said, "Oh, your honor, don't ask me to do that; I am going to a strange country, and I don't want to make any enemies there." And, really, you know, if a man speaks to the same body of men a number of times, he has to be exceedingly careful what he says; and, of all the bodies in the world, I don't want to make enemies in the American Electro-Therapeutic Association.

Mr. Walton, the President of this grand institution, has already given you welcome. I have known Mr. Walton as a great lawyer, as Speaker of the House of Representatives, but never until to-day have I met him as the President of a great college. As for Professor Houston,—why, you know the cloak of Franklin fell upon his shoulders, for I am sure no one could know so much of electricity without having had the direct influence of Franklin fall upon him.

You are met here in one of the gréatest institutions of the City of Philadelphia, an institution that is noted, not for the conservatism to which I referred in my first welcome to you, but for its medical progress.

I am delighted to have again met you, and if this is to be the last time during your stay in the city, I desire to express the hope that your stay has been a pleasant one, and that we shall again meet at some other convention.

Dr. William Benham Snow, President: Before beginning the scientific work of our session I desire to extend our most grateful thanks for the reception that has been ours by his Honor the Mayor and the officers of this College and for the feeling of encouragement engendered by our progressive friends in this institution. I hope to see in the future in other medical colleges in this country the same progressive movements in electro-therapeutics that we find here.

Then followed the presentation and discussion of papers, following which the Association adjourned to the Hotel for the closing session.

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LOCOMOTOR ATAXIA.*

BY FRANCIS B. BISHOP, M. D., WASHINGTON, D. C.,

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In the treatment of any disease, by any of the physical agents, we should have a clear conception as to the nature and physical properties of the agent used, a clear idea as to the pathological condition under consideration, the location of the lesion (if any), and above all a definite purpose (based upon the known facts) in the application. All physio-therapists in the course of time and experience will find some method of treating special diseased conditions which in their hands will give excellent results. If these methods are based upon the facts stated above we may truly say that we are progressing; but to merely state that such and such a condition has been cured or relieved by the application of such and such a current or method adds nothing to our knowledge but creates in the minds of our professional brethren who are not skilled in the physical art a doubt, or at least a suspicion, as to the accuracy of the statements.

In locomotor ataxia, the most common and at the same time one of the most dreaded of all spinal diseases, we have a well-defined pathological condition whose symptoms lead us with unvarying accuracy to the lesion in the posterior column of the spinal cord. This lesion has been attributed to many causes, the most generally accepted one seems to be syphilis. Reasoning from the disturbed physiological functions of the anatomical structures involved, I am led to believe that syphilis is no

* Read before the Sixteenth Annual Meeting of the American Electro-Therapeutic Association, at Philadelphia, September 19, 1906.

more a factor in this disease than many other sources of infection or intoxication.

The multipolar cells scattered singly or in groups in the gray matter of the cord are those in the anterior cornua, those in the posterior cornua and the intrinsic cells distributed throughout the gray matter. These intrinsic cells send out neuraxons which pass into the white matter of the same or the opposite side, pass up and down the cord, enter the gray matter again, and connect there by their end brushes with cells at different levels: they are commissural in their functions and unite the two sides or different levels of the cord. They are themselves in relation with the fibers and cells of the anterior and posterior cornu.

In a typical case of locomotor ataxia the lesion first appears generally in the posterior external column and spreads more or less rapidly to the posterior internal column; and if the disease be progressive, other columns are sooner or later involved. These posterior internal and external columns, of course, represent a great number of afferent nerves which pass from the periphery to the posterior spinal ganglia and from thence to the medulla, pons, cerebellum, the basal ganglia, and to the cerebral cortex. The cells of ganglia of the posterior roots act as the centers for the nutrition of the nerve fibers given off from them. While the lesion that produces the symptoms of locomotor ataxia usually selects those parts of the cord most highly specialized and which must supply energy to the extremities, viz.: the lumbar and cervical enlargements; these parts being constantly under strain during our walking and working periods of life must feel any prolonged and vigorous effort. And when the nervous system is greatly depressed from any cause, be it syphilis, grip, malaria, or, in fact, any infectious disease, excess of venery or from some toxic agent, if the cord is then subjected to prolonged effort it is but reasonable to suppose that these posterior ganglion cells in the path of greatest strain will become exhausted and fail to supply nutrition to those fibers of the sensory tract given off from them and if deprived of nutrition sufficiently long degeneration must follow.

In order that there may be perfect and harmonious action between the sensory and motor functions, the nerve cells and fibers from the periphery to the cortex of the brain and from

the cortex of the brain to the periphery must be healthy with conduction unobstructed; for the gray matter of the anterior cornu contains an apparatus with various complicated co-ordinating powers, which apparatus is under the control of the neurons whose cells of origin are in the cortex of the brain. This apparatus is reflexly influenced by sensory impressions passing to the cord. These physiological facts being considered, we can readily see why a lesion of degeneration in the posterior root zone of the spinal cord will produce the modifications of sensation, of the special senses, muscular senses, muscular movements, bladder and rectal paralysis; the sympathetic ganglia and nerve disturbances that produce the gastric crises, Argyll-Robertson pupil, and optic nerve degeneration. In fact through the direct and reflex influences of such a lesion all the symptoms of locomotor ataxia may be accounted for.

This brings us to the question of therapeutics. Medicine has been used in the form of nearly everything known, and except in a few well-defined cases due to syphilis, medical treatment we may say has been a failure. The best effects have undoubtedly resulted from some form of physical treatment, and I firmly believe that by properly directed physical methods a certain proportion of cases seen, recognized, and treated in the very early stage of the disease will get well, and that some of the cases in the second stage may be much relieved, often to such an extent that they may get up- and down-stairs, move around in the dark, and resume their usual duties, if not laborious, while many cases even in the third stage, may be made much more comfortable, and be enabled to assist themselves in a great measure. There are a certain proportion of cases, however, that rapidly develop and run an acute course from beginning to end. The prognosis in such cases is bad. They usually die within one, two, or three years.

When the patient first begins to have pains of a shooting and neuralgic character in the extremities and before he realizes that he gets around badly in the dark, or that his co-ordination is affected we may find by careful examination that the muscular sense is deficient; thus the beginning inco-ordination is really the first symptom that can usually be discovered by physical examination. With the patient lying upon his back, with eyes closed, if the toes of one foot are placed in a flexed or ex-

tended position the patient will be unable to tell the position or to duplicate it with the toe of the other foot, and the same with the position of the feet and legs. The body will be bent a little further forward than normal in rising from the sitting position, the feet will be placed a little further apart, and the body bent further forward in squatting and rising from that position. So in the muscular sense we find evidences of the disease before the patient suffers from severe pain or feels the peculiar numbness in the feet and a great amount of swaying is noticed when the eyes are closed and often long before eye reflexes are affected. The patient should be examined in every known way when locomotor ataxia is suspected, especially the muscular co-ordinating sense should be investigated with the patient lying, standing, sitting, balancing, running, stooping, and squatting.

The posterior columns of the spinal cord are in such intimate relation with the cerebellum and its functions that afferent impulses that are obstructed modify very early the functions of the cerebellum and the muscular sense seems to be the first function disturbed.

As the case progresses, peripheral impressions are incorrectly interpreted, or are delayed in transmission, and as these delayed and misinterpreted impressions are received by the cells in the peripheral endings of the sensory nerves; the impulses that they transmit are disorganized and distorted and result in pain, inco-ordination, and paralysis. This is due to the fact that a link in the chain of conducting material has its harmony of action disturbed by congestion, inflammation, and degeneration, thus modifying the free and healthy flow of impulse from the periphery to the brain and from the brain to the periphery; producing in their order the preataxic, the ataxic, and the paralytic stage of the disease, with their complications according to the extent and severity of the spinal lesion.

When the primary congestion makes its appearance the patient may complain of pains, shooting in the extremities or thighs. These pains are often suspected to be rheumatic and are so treated. All such pains should arouse suspicion and a careful examination of the muscular senses should be made; for should it prove to be a case of tabes in its early stage, rest and treatment will do more good at this time than at any other, and this is the only stage of the disease where there is a prospect of complete recovery.

In a degenerative lesion of the posterior root zone many fibers are destroyed, and others are pressed upon and do not functionate on account of the inflammatory encroachment. Those that are destroyed can, of course, never be repaired, but if we can, by the use of any agent, release the other fibers from pressure and stimulate the spinal ganglia to increase their nutrition to those fibers that are not yet destroyed we may do much to restore harmony in the conducting chain.

Nature, generally speaking, is a good manager, and has many sources of defense and retreat, so through the intrinsic cells of the gray matter of the cord we may hope by treatment and training to bridge over the diseased area by the aid of these neuraxons that are running in all directions and uniting by their end brushes the different levels of the cord, and thus modify to a degree the abnormal impulses. Then again while the motor impulses are more or less influenced reflexly, the volitional efferent impulses can train those muscles not involved to assist the involved muscles to control their actions.

So with well-regulated treatment directed to the diseased area of the spinal cord, with the aid of vision and due exercise of the will and by careful training of the muscular movements, by systematically directed exercises, we may do much to impede, if not stop the progress of the lesion, to relieve from inflammatory encroachment those fibers of the posterior column that have not been destroyed, so that they may resume their function and perhaps through the aid of the intrinsic cells of the gray matter, bridge over with normal impulses from below the diseased area, and give rest to the seat of lesion with a chance to repair.

The following case, written at my request, by one of my ataxic patients may be of interest:

"In July, 1904, I went to Dr. Bishop for treatment for what I thought might be locomotor ataxia, having for some time previously experienced the following symptoms: pains, staggering when my eyes were shut, difficulty in picking my way through a crowd, finding it almost impossible to walk up or downstairs without holding the rail or wall, and extreme fatigue in the legs upon slight exertion.

"The first of these symptoms I noticed when bending over a bowl in washing my face, my head would be thrust against the wall or I would fall backward. Next I noticed that when

I got off a car, if the street was poorly lighted, I had hard work to keep my balance until I got used to the light. In attempting to run from the sidewalk to the middle of the road to catch a car, I discovered my ability to run was entirely gone. I commenced treatment in July, 1904, and continued until February, 1905, with some intermission, when I felt so well that I thought I would get along all right without the treatment, the symptoms having nearly disappeared. About December, 1905, they began to appear again and gradually got worse until February, 1906, when I became almost helpless. Pains returned. I could not get upstairs in the dark. Even when holding the rails my legs would double up under me and I could not tell which way they had doubled. Sometimes my foot would seem to sink into the ground and I would fall down and feel sure my foot had sunk into a hole. This would occur in daylight and I would be quite surprised when I saw the leg above ground.

"When the symptoms returned, together with the shooting pains that I had had in my legs and stomach (which I forgot to mention), there were continuous pains just under the ribs,—sometimes on the right side and sometimes on the left; also a feeling as if my chest were being crushed in. I went back to Dr. Bishop for treatment, my wife having to accompany me for some time. The pains stopped at second or third treatment, and I gradually got better, until at the present time I can walk upstairs in the dark. I can go up and down without holding the rail, though I still have to be very careful. I still carry a stick when I go out, as I have become accustomed to it, but I do not use it much for support. On the whole, it seems that I am on the road to recovery and am certainly greatly benefited.

"Signed: T. B."

My patient is very optimistic but of course he is ignorant of the true nature of his malady, and while he has made rapid progress, I do not believe that he will ever be much better than he is now, but if he remains in his present condition he has much for which to be thankful.

My object in the treatment looks to the absorption and possible dissipation by electrolytic action of the products of inflammation, to increase the nutritive action of the posterior spinal ganglia, and to the stimulation to activity of the intrinsic cells of the gray matter; to open the path of conduction.

from below as much as possible through the diseased cord, give rest and regulated exercise, and develop the patient's will power and the use of his vision. The former effects I endeavor to bring about by the aid of the continuous current and the static spark and the latter by training. The treatment of any individual case will require special attention to treatment and will in most if not all cases require considerable time.

My patient is placed upon his stomach, face down, with a large pad well saturated with warm water, placed under him so that the solar plexus will be covered; the pad employed is about 8 x 10 inches and attached to the positive rheophore. A pad ten (10) inches long and three (3) inches wide is placed over the spine, covering the diseased portion of the cord, and is connected with the negative rheophore; the current is gradually turned on to 20, 25, or 30 milliamperes, according to the tolerance of the patient, taking great care that equal pressure is made upon the upper pad throughout its length. This current is used every day and is allowed to pass from half an hour to three-quarters of an hour. If the patient complains of burning, the current strength is reduced. While in this position the bottoms of the feet are treated to a series of short percussion sparks from the static machine. By this latter means we stimulate the peripheral ends of the afferent nerves, and stimulate also the posterior nerve ganglia and hope to bombard as it were by nerve impulses the obstructed area of the diseased nerve fibers. The eye muscles and mind are trained together by causing the patient each day to walk straight lines, curved lines, walk up steps, and in various ways using the will power to his utmost to control the action of his muscles; to stand with eyes closed and feet together; to lie in bed and try with eyes open and then closed to co-ordinate various movements and in fact to carry out according to the case the movements as laid down by Frenkel in his work on Tabetic Ataxia; keeping always in view the one object, to train but not to fatigue the patient. I have often been surprised to see how these patients may be made often to walk in the dark and to do many other things which they found it impossible to do before by the careful training of the will, the eyes, and the muscles, together with well-directed electrical treatment.

1913 I Street.

Discussion.

Dr. Alphonso D. Rockwell, New York City: I would like to ask Dr. Bishop whether the patellar reflex was absent in his case. If the patellar reflex was absent it does not necessarily indicate that the man had locomotor ataxia, but if present the condition was not that of locomotor ataxia. I have never seen exaggeration of the patellar reflex in locomotor ataxia, only in lateral disease of the cord and in myelitis.

The results certainly indicate the beneficial effects of electricity in that particular case, but personally I doubt very much whether it was one of locomotor ataxia. I have seen cases with symptoms simulating those of locomotor ataxia and which entirely recovered. If the case was one of locomotor ataxia the doctor has gained a great triumph, although I believe he did not claim that the case was cured. I have had much experience with the disease and have given much attention to the syphilitic causation of the disease, and I have never seen a case completely recover. I wish I could say I had. I have treated the ataxias with galvanic, high frequency, the static spark, etc., and I doubt whether a case of true locomotor ataxia has recovered under electrical or any other method of treatment.

Dr. F. H. Morse, Boston: I have been much interested in the paper, and while I understand that locomotor ataxia is not a curable disease, I think that if we can obtain a higher degree of spinal nutrition we can in a large proportion of cases retard in a degree the progress of the disease. I have seen well-marked cases in which the patient has been confined to the house, so improve under electrical treatment, with the building up of the general nutrition, that they have returned to work. As regards technique, I have felt more certain of my results for the lightning-like pain in the legs and the general weakness of the back with the strong static indirect spark. It is a well-known fact among those of us who have used static electricity that the ataxia cases rather enjoy the spark. In the case of one patient seen in my office who was obliged to use two canes there was great improvement at the end of a month, and later he returned to business. He is not cured and never will be, but the progress of the disease has been retarded for the time being. As Dr. Rockwell has said, there are many cases of numbness of the legs diagnosed as locomotor ataxia. We have, however, in locomotor ataxia symptoms so marked and well defined that a mistake in diagnosis is almost inexcusable. A strong direct current to the spine for a long time is more depressing than otherwise; but just enough to have a nutritional effect gives better results.

Dr. A. C. Geyser: I wish that Dr. Bishop had left one or two phrases out of his paper. The first one that I object to is

the statement that cases seen early get well; the second, that cases seen later do not do so well, and that there are some cases that go on rapidly and die in two or three years' time. This has no bearing on the treatment, for in cases seen early we have some doubt whether the disease is locomotor ataxia, because the symptoms are not prominent; those are the cases that help our statistics in recovered cases. In the "cases seen later" we say as our excuse that "they came too late" for cure. The cases that have a rapid course are not benefited by anything we may do.

I am glad, however, that the doctor did not state that he had any hope of curing locomotor ataxia. I do not think the disease is curable in that sense of the term. If, however, by any method of treatment we can stimulate those collateral fibers on each side of the spinal cord to do the work which they are capable of doing, then in that measure do we not cure, but mask the symptoms, and the patient may be enabled to perform all necessary functions. I have a patient under my care at the present time who came to me with all the symptoms of locomotor ataxia well developed. As long as he could see where he was putting his feet he could walk. I then trained him to walk without seeing while wearing blue glasses. In this way he got into the habit of walking because he trained his feet to walk in the dark without using his eyes. He simply has developed some other sense. That is really what we do in electrotherapy.

Dr. Morris Weil Brinkmann: The writer of the paper and the gentleman who last spoke have given us, I believe, something valuable. The treatment in this disease has for its object the development of or the restoration of a lost sense. If that sense is in abeyance,—if the secondary degeneration in the cord has not passed the point where all sensation becomes impossible,—we can hope to restore enough sensation that the sense may return; but in cases where the degeneration has passed that point we have to depend upon something else.

I do not know whether this disease cannot be diagnosed early. I do not entirely agree with the last speaker. While there are many phenomena which precede the loss of locomotion, whether the physician is ever given the opportunity to see the patients at this time is a question. I have seen many cases in which there is a slight irregularity in the gait and cases in which, when the attention is distracted, they walk erratically. These conditions are frequently regarded as simple peculiarities and the physician does not see them at that time. If we could have something more definite with reference to the pathological studies of these sections of the cord that would acquaint us with the cause of the condition we could hope to accomplish more than at present. All, I think, are agreed about the cure of the condition. I don't believe that ad-

vanced cases ever become cured. The only question unanswered being—which are advanced cases?

Dr. J. D. Gibson, Denver: I think we should pay as much attention to the diagnosis of locomotor ataxia as to the treatment and I believe the disease can be diagnosed before there is want of locomotion. It seems to me that there should be symptoms of the disease in this stage which could be recognized as characteristic of the disease; my experience, however, has not been sufficient along this line to speak positively. Several years ago a patient was brought to me apparently with neurasthenia. There was great hypersensitiveness about the lower extremities and almost all over the body. There was a specific history. He had shooting pains about his body and limbs and had been unable to get relief. He had been to many physicians and the diagnosis in all instances was that of neurasthenia. My diagnosis was that of neurasthenia, but with the proviso that I feared locomotor ataxia. There was still some patellar reflex, no Argyll-Robertson pupil, but there were pains in the legs and a general neurasthenic condition which I attributed to irritation going on in the spinal canal. While I was not willing to make a diagnosis of incipient locomotor ataxia, that is what I feared. He so far improved under treatment that he abandoned it, when in a few weeks he had a decided exacerbation of his condition and was brought to Philadelphia to some specialist. A diagnosis was made of neurasthenia and he finally went to Hot Springs, where he stayed for some months without amelioration. From there he went to Johns Hopkins, and there after some time he was told that he had incipient locomotor ataxia. I have not seen the patient since, but I understand that he is up and about but not well. An interesting feature of the case is that this man was the only patient I have seen who could not stand static electricity, but galvanism had a soothing effect. In the technic I placed a large pad in the nape of the neck and the lower lumbar region and passed the current downward. I find usually that the static spark is rather agreeable to cases of locomotor ataxia and probably benefits them to some degree. I do not think that the benefit is wholly from the mental influence.

Dr. Herbert F. Pitcher, Haverhill: In one case of locomotor ataxia treated by the continuous current rapid improvement occurred after giving the patient heavy sparks. When he first came to see me there was complete relaxation of the sphincters, and he was unable to get into the office without help. I intend to send him to the Massachusetts General Hospital and have him taught to walk. A Swede there under Drs. Walton and Taylor has a class of toxic patients and uses the Frenkel method with great benefit. Patients who have been treated by different methods improve up to a certain point and are then unable to co-ordinate their muscles. He then takes them, and

it is very interesting to see the enthusiasm of the class and to see them compete with each other. As Dr. Geyser says, I think many of these cases can be taught to walk.

Dr. Bishop (closes) : I am sorry that Dr. Rockwell has gone before I could have a chance to answer him. It seems that whenever one gets good results in cases that are usually considered hopeless, that his diagnosis is immediately questioned. I think anyone who has given nervous diseases any considerable study and has had a large experience in treating those diseases ought to be able to diagnose locomotor ataxia; for there are only a few diseases with which it could be confounded. In neuritis, for instance, there is almost always preceding fever, accompanied by pain, while locomotor ataxia comes on more rapidly, often without fever and with its own characteristic shooting, darting pains. In other conditions with which it might possibly be confounded we have a number of symptoms that we do find in locomotor ataxia. I will not go into the points of diagnosis before an intelligent audience. To go over the points of differential diagnosis before this audience would be an insult. Suffice it to say that this case reported was a case of locomotor ataxia.

Dr. Geyser was very fair in his discussion. He seems to catch my idea exactly. I regret that he is sorry that I spoke of the cases that die; my paper, however, was on locomotor ataxia, and I did not think it would be complete did I not say something about the cases that die.

I did not say that I could cure locomotor ataxia in any stage. I simply said that I believe if the case is seen early enough it can be cured. I do believe it, but I do not know it. When my paper is printed, I hope that it may be carefully read, so that I may not be accused of making wild assertions. If this paper will cause my friends to devote the time and care necessary to the treatment of these cases, much suffering may be avoided.



ELECTRICITY IN OCULAR THERAPEUTICS.*

BY S. LEWIS ZIEGLER, M. D., PHILADELPHIA, PA.,

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The medical profession for more than a century has looked with great skepticism on electricity as a *terra incognita* unworthy of investigation. The marvelous scientific development of this revolutionizing agent in the field of commercial utilities, during the past two decades, has stimulated the modern medical mind to a realization of its living potentialities and therapeutic possibilities. The internist and the neurologist have blazed the way. The ophthalmologist has either followed as an enthusiast, or a rank agnostic, according to his success or his failure in grasping and applying its therapeutic principles.

The galvanic current is probably the most efficient modality that we can employ in ocular therapeutics. The high-frequency current has been much exploited, but it is still employed tentatively, and its therapeutic indications and applications are not sufficiently defined. Dr. Abadie, of Paris, who advocated its employment for a time, has reverted to the use of plain galvanism. Its therapeutic possibilities, however, are probably inherent and simply await scientific development.

The galvanic current has a twofold action (1) physiological, and (2) physico-chemical, as seen in electrolysis and cataphoresis. These facts must be kept in mind in explaining the diverse electric phenomena and the resulting therapeutic effects. The first named action is manifested chiefly in its direct effect on the nervous system, while the more obscure bio-chemic action not only originates a decomposition of the watery elements of the solids and fluids of the body, but also transmits certain well-known chemical agents from one pole to the other. The whole process is, therefore, a most complex one.

The effect of polarity on the subjacent tissues covers the very essence of therapeutic action. The anode or positive pole is sedative in its action, and should, therefore, be applied to all inflammatory lesions, while, per contra, the cathode or

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association, at Philadelphia, September 21, 1906.

negative pole has a stimulating effect, which benefits atrophic conditions. This dictum is not inflexible, but may be modified according to the experience of the observer. For example, the rule is reversed in glaucoma where the negative pole will reduce the hypertonus, and control the disease, while the positive pole will exaggerate all the symptoms. The polarity should, therefore, be easily discernible and kept clearly in mind, as

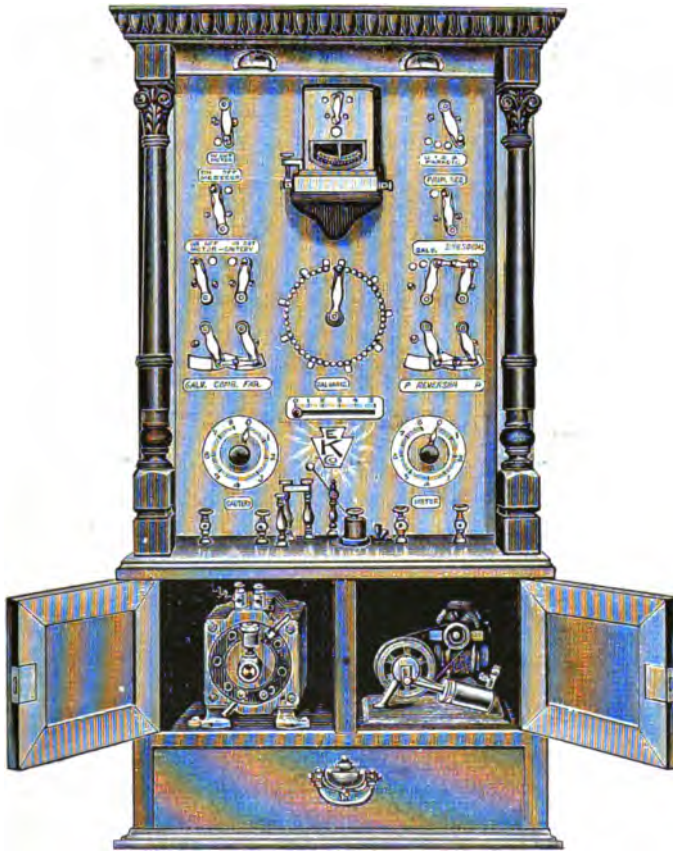


Fig. 1.—Keystone electric cabinet, arranged for treatment of the eye.

reversal of the current may not only be painful or injurious, but might cause ultimate blindness.

For use in an organ as delicate as the eye, all the apparatus should be carefully adjusted to measure most accurately the therapeutic currents employed, and the current should be applied with the greatest precision. As a rule, the constant

current yields the best results when there is a high electromotive force and a low amperage. Sixty to seventy volts may be used, controlled down to one-half or one milliampere. A higher amperage would require a lower voltage, as stronger currents would be unbearably painful to the eye. If a battery is employed, about fifty or sixty cells will be needed to secure the required strength. If the street current is used a volt controller on the shunt principle is necessary, as well as a

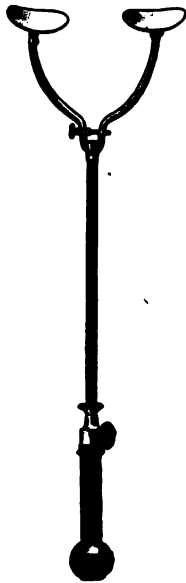


Fig. 2.—Double eye electrode.



Fig. 3.—Sponge neck pad.

carbon rheostat to control the amperage. I always use the ninety-volt shunt controller as arranged in the Keystone electric cabinet (Fig. 1), with a secondary carbon rheostat and a milliamperemeter in circuit with the patient. The milliamperemeter should be arranged for lower readings, on a secondary scale, graduated from zero up to five ma.

The two electrodes must be well constructed, and should always be carefully watched for the development of defects which may occur while in use. I have had the active electrode made with a curved metal eye-piece (either single or double), a long thin arm, and a thick hard-rubber handle that can be easily grasped by the patient (Fig. 2). I have abandoned the use

of platinum foil, and now depend on gold-plating. The eye-piece must, of course, be well covered with a pad of moistened absorbent cotton to prevent the gold being driven off by cataphoresis when the positive current is used. The indifferent electrode should be made as a neck pad, 2 x 3 inches, the sponge being stitched on thick sheet rubber (Fig. 3). The sponge can easily be moistened, the rubber back wiped dry, and then placed inside the patient's collar without soiling the clothing.

The galvanic current may be combined with the faradic current, which often increases its efficiency. It may also be given as a slowly interrupted current; or as a rapidly alternated current, generally known as the sinusoidal current.

Sittings should be given daily or on alternate days, and should last about ten minutes. In some cases, after a ten-minute sitting of 1 ma. the current may be lowered to 1-2 ma. for a second ten minutes.

The positive pole is indicated in all inflammatory processes (glaucoma excepted). Plastic iritis, spongy iritis, iridocyclitis, or choroiditis show a distinct shortening of the disease when the positive pole is applied. Serous iritis with keratitis punctata, is probably the most striking example of this prompt improvement, as it will clear up in from three to six weeks, while as many months are often required under the usual medication.

I recall a case of acute scleritis, with flannel-red eyes, that had suffered sleepless nights for almost two weeks. This was bleached out and the congestion dissipated after the first treatment. The relief from pain and photophobia was so sudden as to be almost startling to the patient. The convalescence was brief and permanent. In hyperesthesia of the retina and in retinitis pigmentosa the positive pole is indicated, although the latter disease is often improved by changing to the negative pole, or to the sinusoidal current, for a short time. Small cellular inflammations and some forms of chalazion may also be checked by positive galvanism.

The positive pole is likewise useful in cases of long standing intraocular hemorrhages, which show no signs of absorption. This is doubtless due to an electrolytic effect, which at the same time stimulates lymphatic action. I have seen a hemorrhage in the vitreous, stagnant for a year, with necessary blindness, rapidly cleared up to useful vision. Subretinal hemorrhage is also amenable to this treatment. A case of macular hemor-

rhage was referred to me about a year ago, which had been under alterative treatment for about three months, but still remained a vivid red spot, with a vision of 20-200. Under positive galvanism this spot cleared up rapidly, and in one month he was discharged with a vision of 20-30 and Jaeger No. 2, all hemic pigment having been absorbed.

In like manner vitreous opacities are amenable to the same treatment. I can recall a case that had been treated with iodids for almost two years, and had a vision of 20-200 and Jaeger No. 20, when I first saw him. In six weeks the use of positive galvanism had improved the vision up to 20-40 and Jaeger No. 2.

As previously stated the negative pole is most efficient where stimulating effects are required, as in optic atrophy. It should be used with great caution, as over-stimulation or exhaustion must be carefully avoided. In cases involving the spinal cord, not much improvement will be noted. Other conditions, however, may show most unusual improvement.

A case of optic atrophy was referred to me about fifteen years ago with a vision of 20-200 which was gradually stimulated up to 20-40 and Jaeger No. 4. This useful vision he retained until his death, some years later. A patient in the clinic of my colleague, Dr. Radcliffe, steadily improved from mere light perception to 20-70.

I have seen a number of toxic amblyopias from excessive use of tobacco show marked improvement, and a case arising from inhalation of the fumes of wood alcohol recovered practically normal fields and vision after a year of careful treatment.

Negative galvanism has been applied directly to glaucomatous eyes, and I have been able, thereby, to relieve an acute attack and prepare the eye for subsequent operation. It is also claimed that galvanization of the cervical sympathetic has relieved glaucoma.

Electrolysis, as a direct and local measure is employed for epilation in trichiasis (the needle being the negative pole), in shrinking up small tumors, and in trachoma, where the bipolar needles of Johnson, of London, give the best results. I have modified Alleman's corneal electrode by substituting a small convex tip for the cup, and applying this directly against the cornea without the intervening drop of mercury. This form

of electrolysis has proved very useful in treating corneal ulcers, powder marks, and leucomata.

Cataphoresis has a limited but valuable field, which is as yet unexplored. By placing medicaments on the positive pole we can drive them into the ocular tissues. In a case of cardiac disease, where etherization was contraindicated, I applied a twenty per cent. solution of cocain for twenty minutes, and enucleated the eyeball without the patient suffering much discomfort. This is a valuable addition to our methods of anesthesia, and should be utilized as such.

The galvano-cautery is used chiefly to cauterize corneal ulcers where there is a marked tendency to slough. A single drop of fluorescin will stain and clearly outline the area to be cauterized. I have often made a galvano-caustic peritomy with success in cases of confirmed pannus, by burning a small groove around the cornea at the sclero-corneal junction, thus cutting through the vascular network and permanently checking the corneal invasion by forming a cicatricial bank in the line of the eschar. This procedure is equally efficient in cutting off a single leash of vessels that sometimes persist in spite of the usual treatment. I have employed galvano-caustic puncture for many years in cases of ectropion and entropion, by making a row of deep punctures with a pointed cautery tip about 4 mm. from the lid margin and separated from each other by an equal interval. These should be made on the side we wish the contraction to take place, viz., the conjunctival surface in ectropion and the skin surface in entropion. If necessary, we can repeat in two or three weeks. From one to three sittings will accomplish as much as a plastic operation would do. Ice pads should be applied constantly for a few days to control the slight swelling and discharge. In angiomata this puncture is frequently more efficient than electrolysis. I have also used it in cases of trachoma with rough cicatricial granulation.

The value of the x-ray in ocular therapeutics is too well known, and the subject too broad, to require more than brief mention here. It has been successfully employed in cases of malignant tumor, rodent ulcer, trachoma, and renal conjunctivitis. It has proved itself to be simply invaluable for the accurate localization of foreign bodies in the eyeball and orbit.

The experienced observer will doubtless be able to add many

valuable observations to the limited suggestions of this paper, and it is only submitted for the purpose of stimulating such discussion. In closing I can only add that the evidence before us forces us to the conclusion that electricity must be classed as a most valued entity in ocular therapeutics.

1625 Walnut St.

Discussion.

Dr. G. Betton Massey: I feel that our Association is to be congratulated upon hearing the paper of Dr. Fox and the well-remembered résumé of the paper of Dr. Ziegler which was to have been placed upon the program. I feel the value of these papers particularly because I am aware of the enormous field for electric modalities in eye cases, and that that field is not confined to its neurological relations. Probably no one present knows less about eye troubles than I, yet I can add some negative testimony to certain electric procedures that have been recommended. More than one of my ophthalmic friends have sent to me cases of optic neuritis with the hope that since nothing else will do any good, perhaps the battery will. I have never had any effects whatever with the current employed by me in optic neuritis. I have confined my treatment of this condition to the constant current alone, and almost invariably to the negative pole, with pads on the closed lids. I am glad to hear of the possibilities of the high-frequency currents, and also to know that some others adhere to the value of the constant current in certain surgical conditions of the eye. I do not now refer to malignant conditions, in which I also consider cataphoresis invaluable.

I would like to inquire whether Dr. Ziegler has had any experience in the electrical treatment of trachoma. I alluded to that some years ago at the meeting in Buffalo, and asked that it be tried, giving the technic, which is as follows: Make the electrode—if you are at some distance from the manufacturers—from a gold spectacle frame, 14 or 10 karat. Amalgamate it with mercury, insert into the diseased glands under cocaine, and then drive the mercury into the diseased spot by using it as a positive pole. By previously driving out the alloys by employing it in salt water, you have a pure gold electrode in a porous condition, and one well adapted to the treatment of trachoma by puncture under cocaine when coated with mercury. The negative pole is placed on some distant part of the body. Try the effect of half a milliampere for ten minutes. This procedure I think might lead to other minor surgical uses of cataphoresis—around the lids—of course, not on the eyeball.

Dr. Ziegler (closes): I have not had the opportunity of using the method referred to by Dr. Massey and I did not know that he had before advocated it. I have, however, used other electrical methods in trachoma. I have used the single electrolysis needle, but I have found the double electrolysis needle of Johnson, of London, of more value, because of the directness of the application of the current. Of course, I have used the galvanocautery. All these methods are slow, yet it is well to try them in certain selected cases. We have, however, other measures which are more rapid for the reduction of granular lids.

I have used cocaine by cataphoresis for enucleating the eyeball, which was done without much discomfort to the patient. I think there is a large field for cataphoresis if properly worked out. There are many medicaments that might be employed in this way and their local effect obtained.



STATIC ELECTRICITY IN THE TREATMENT OF PELVIC CONDITIONS.

BY M. L. H. ARNOLD SNOW, M. D., NEW YORK.

To the public in general whose association with electricity has been principally with the continuous (galvanic) current or with the electric railways, the mere suggestion of electrical treatment brings before them a vision of wet sponges, the electric chair, and accidents from the street current. To them, electricity too often is a weapon of terror and destruction, and if their physician is not one who has investigated the more modern methods of its use therapeutically, he will be apt to re-enforce the patient's fears, or actually criticise the use of that of which he himself is blissfully ignorant.

When the patient dares in face of such exigencies to come for static treatment, he is agreeably surprised not only at the many ways in which it may be administered, but at its freedom from danger, for though the static current is one of immensely high voltage, it is of very low amperage and is therefore harmless even in the hands of the novice.

The static modalities employed in the treatment of pelvic conditions are the Morton wave-current and the high-potential current from the vacuum tube either attached directly to the machine, or by means of a resonator.

The wave-current has a remarkably extensive field of action. It is produced as follows: The patient seated on the insulated platform is connected to the positive prime conductor by means of a rheophore attached to an electrode in contact with the body, the negative prime conductor being connected by a chain to a gas-pipe or water-pipe, grounding the current in this manner, increases the intensity of current conveyed to the patient by either the metal or glass vacuum electrodes. A discharge is rhythmically passing between the balls of the discharging rods—the spark-gap. The rapidity with which the sparks are repeated will depend on the regulation of speed or the length of the spark-gap; i. e., with a given speed as the distance between the discharging rods is increased, the frequency of the oscillations will diminish. The rhythmical charge with intervals of release causes "synchronous contractions and relaxa-

tions by which means intrinsic activity of the tissues is induced." Owing to this peculiarly intrinsic action of the current it is invaluable to relieve stasis, congestion, and their effects. If the spark-gap be too long or the periodicity of discharge too rapid when near the limit of comfort, a cramping or tetanic contraction occurs which is uncomfortable. These rhythmical effects lessen the amount of blood in the parts and relieve the congestion present, permitting the re-establishment of normal circulation and repair. These contractions increase the contractile force of the muscles and probably increase the power of conduction of nerves, as is demonstrated in the restoration of functions in the successful treatment of brachial neuritis. The amount of active exercise induced, work done by a part, should correspond to that of moderate exercise in general with respect to its employment and effect. The effect of the wave current varies according to the way in which it is administered, as regards frequency of oscillation; duration of treatment, and length of spark at the spark-gap. The relation of the speed and spark-gap should be such as will induce a distinct vibratory effect without causing too great pain or too severe muscular contraction. If the duration of the treatment be too long, the patient will feel fatigued the next day and may be sleepless owing to over-stimulation. The alternate contractions and relaxations cause an increased activity of metabolic processes. The contractions compress the blood vessels and thereby, as Dr. Wm. Benham Snow has said, "force out the infiltrate through the lymphatics and blood channels, at the same time increasing the functional activity of the cells, promoting the absorption of round cells and other inflammatory products." The currents mentioned are therefore particularly applicable to pelvic disorders characterized by hyperemia. If hyperplastic tissue be present the wave-current will not remove it, but congestion and edema when present will be dissipated and the parts will diminish in size and weight. The wave-current has also a tonic effect as it promotes metabolism. By diminishing the congestion it lessens pressure and consequently relieves pain or tenderness. It has no appreciable electrolytic effect as the amperage is so small, and the current is consequently relatively harmless.

In the treatment of women the wave-current is particularly indicated in salpingitis, subinvolution, endometritis, dysmenor-

rhea, retroversion due to the enlargement of the uterus, and in delayed menstruation.

The treatment is free from objection even to young girls, as it may be effectively administered per rectum. The patient lies in a proper reclining chair or couch on the platform, with the buttocks opposite the positive pole. A metal electrode about six inches long, which is attached to a vulcanite handle and connected by a wire to the positive side of the machine, having been first warmed and lubricated, is introduced, following the posterior wall of the rectum. When it has been inserted, the handle is moved backward, thus placing the electrode against the uterus. This handle may be inserted between the pages of a very thick volume, so the electrode cannot be expelled, or it may be held in position by the patient or by an x-ray tube holder. The negative side of the machine is grounded by a chain from the negative prime conductor to a gas fixture or water-pipe. The machine is started at a low rate of speed and the spark-gap gradually lengthened according to the tolerance of the patient. In acute cases the spark at the spark-gap that will be borne will not exceed one inch in length. In these cases at each successive treatment, as congestion and tenderness diminish, an increased length of spark-gap can as a rule be used. The duration of each treatment is twenty minutes. If there is a marked retroversion it may be difficult to introduce the electrode to its full length at the first treatment, but as the congestion of the uterus is diminished, it rises in the pelvis and the difficulty becomes less, so that usually after two treatments it can be readily introduced to a length of 4 to 5 inches.

In some cases it is desirable that the wave current be used as usual for fifteen minutes followed by the swelling current for five minutes. This is produced by successively opening and closing the spark-gap from the grounded side of the machine, thus rhythmically making a maximum and then minimum spark, causing marked alternate contraction and relaxation. Chronic constipation may be treated in the same manner.

Administrations should be made daily at first; in many cases, particularly of endometritis associated with dysmenorrhea, daily treatment for a month may be advisable. The changing of the position of the uterus, the lessening of its weight, the diminution or even absence of pain after a month's treatment are results almost incredible to those unfamiliar with this

method of treatment. The wave current not only relieves stasis, congestion, and pain, but acts as a natural tonic without derangement of the stomach, and relieves the numerous reflex conditions characterizing neurasthenia and hysteria due to pelvic derangements.

In cases of *engorgement of the uterus* or subinvolution with copious discharge, in addition to the wave-current treatment, the employment of the vaginal vacuum electrode is of service. Employ the vaginal tube in a proper handle. With the patient lying on her back, and having the legs flexed, introduce the tube, lubricated at the distal end only. Place it in its proper position, so the cervix fits in the depression at the end of the tube, and then adjust the x-ray tube holder so that it will hold the handle at the proper angle. Carry the wire below the popliteal space, thus keeping it away from the thighs and buttocks, and attach it to the positive side of the machine, the negative side being grounded, or *vice versa* if a greater chemical effect is desired, as when the vaginal discharge is of an infectious nature. Warn the patient to keep her knees apart, as there will then be no danger of her receiving sparks, which although harmless are not acceptable, especially when they come as surprises.

If *salpingitis* or a *septic* condition be present, treat the patient from the resonator of the static machine or a coil, which "owing to its greater amperage has a greater actinic effect and is more destructive to the germs present, and produces no contractile effect which might cause rupture of the tubes." In such a case with the static machine, use the d'Arsonval current, one connection being made to the vacuum tube in the vagina, and the other to a large metal plate on the abdomen. The length of treatment should be for ten or fifteen minutes.

The vacuum tube discharges are stimulating, analgesic, rubefacient, and antizymotic. When taken directly from the static machine, they cause marked contraction and local vibration not to be obtained with the vacuum tubes from any other source.

One of the most valuable methods is that of treating menorrhagia and metrorrhagia with the combined use of the galvanic and static currents—conditions ordinarily treated by curettage. Employing a speculum, introduce a properly curved copper intrauterine electrode into the uterus and connect it to the

positive pole of the galvanic current. The indifferent electrode may be placed upon the buttocks or abdomen. Use ten milliamperes of current for ten minutes. At the expiration of the time, if the electrode has not been constantly moved to prevent adherence, gradually turn off the current and reverse the poles. Then give the negative current with eight to ten milliamperes until the electrode is entirely free from the tissues, when the current should be turned off and the electrode withdrawn.

On the following day and subsequently as the conditions indicate, administer to the uterus per rectum the wave-current for twenty minutes, using the metal electrode connected to the positive pole of the static machine, the negative being grounded, and follow this with treatment with the vaginal vacuum tube for ten minutes, the patient lying on her back with knees flexed, the tube being connected to the positive side, the negative being grounded.

The wave-current applied in the same manner is successfully used in *amenorrhea*. The use of a high-power incandescent lamp over the pelvic region posteriorly and anteriorly until a reaction occurs is also a useful adjunct to the treatment. In these cases if light is employed it should be used before the static treatment is given for two reasons, first, because the relaxing effect of light and heat radiation should precede the static wave-current, and second, as it gives the patient an opportunity to cool off with less delay before leaving the office.

The static wave-current is also valuable in the treatment of *spasmodic stricture of the anus*, in which case the spark at the spark-gap should be increased to as great a length as the patient can tolerate, the object being to over-exercise the sphincters, tiring them to the extent of inducing relaxation. This condition, frequently met with in locomotor ataxia, as a rule requires but few applications.

The static wave-current from the positive side, the negative grounded, administered by means of a metal electrode in the treatment of *prostatic hypertrophy* as instituted by Dr. Wm. Benham Snow, meets effectively the indications, removing the infiltration by "relief of local stasis and a restoration of circulation and the functions of the lymphatics and the other structures of the gland." The use of the wave-current in this manner daily for twenty minutes will meet with success in most

except infected or malignant conditions. In cases complicated by a dilated bladder the complete success of the treatment will depend on the ability of the structure to recover the lost tone. As in all pelvic conditions, or in fact congested states elsewhere, hyperplastic tissue is not lessened by the static treatment, but the other products of inflammation are eliminated. The length of the spark-gap must in all cases be regulated to the patient's sense of tolerance. In acute inflammatory processes a spark-gap of not more than an inch in length will induce pain. When after a few minutes a certain amount of sedation has occurred, it may be gradually lengthened. At each successive treatment it will be possible to begin with a longer spark-gap, which will mark the progress towards recovery. Subacute cases will permit a longer spark-gap at the outset.

In some cases of prostatitis associated with specific infection glass vacuum tubes of various shapes should be used. The vacuum tube should then be connected to the negative side, the positive side being grounded as previously described. The strength of the current as with the wave-current is regulated by the length of the spark at the spark-gap. It should not as a rule exceed three inches or so in length, as otherwise the tube may be punctured. A urethral vacuum tube may be employed if the urethra be irritable. A metal sound, having a wire for connecting it to the machine, attached to the upper end, may be used as an electrode to administer the wave-current to the urethra. The current thus applied is beneficial in some cases. The vacuum tubes applied through the rectum to the seminal vesicles are of great service in the treatment of gonorrheal rheumatism as has been demonstrated by Dr. Edward Titus, also in seminal vesiculitis and epididymitis.

If the patient taking rectal treatment requires a longer spark at the spark-gap than the machine will give in humid weather, place one small and one medium-sized Leyden jar in position for use of the Morton static induced current. Connect a wire from the rectal electrode to the binding post on the side where the medium-sized Leyden jar has been placed, and connect the wire from a large metal electrode upon the patient's abdomen to the binding post of the side on which the smaller-sized jar is placed, taking care that the wires do not cross. The treatment as with the wave-current should be for twenty minutes.

If constipation is a complicating condition administer the static induced current as above described for fifteen minutes and then shorten the spark-gap a little and administer the current for five minutes, making and breaking the current by connecting and disconnecting consecutively the outer coatings of the Leyden jars by moving the indicator rhythmically backward and forward from the starting place to the left and back or by any other device. This causes pronounced waves of rhythmical contraction, thereby awakening an inactive peristalsis.

In the *treatment of caruncles and spasmodic urethral stricture*, the urethral vacuum tube is employed, one as large as will readily pass being used first, the size being gradually increased day by day as the reduction of the caruncle permits. The duration of the administration should be ten or twelve minutes. Treatments should be given daily at first, their frequency diminishing as the condition improves. To administer the treatment, the patient lies on her back, with knees flexed, and then, the tube *in situ* at the proper angle, is held in position with the x-ray tube holder. The connection in these cases is made to the positive side of the machine, with the negative grounded.

In cases of *vaginismus* the success of the treatment with the vaginal vacuum tube is nothing short of marvelous. Begin by inserting as large a sized tube as possible, and day after day, employ larger sized tubes as the condition permits. In most cases the relief is complete after a few administrations. In these cases the connections and duration of treatment are the same as in the treatment of caruncles, a spark-gap to three inches being employed.

Hemorrhoids are treated by the special hemorrhoidal vacuum tubes, treatment being of ten minutes' duration,—daily at first, the frequency later decreasing according to the progress of the case. The patient may lie with the buttocks towards the positive pole. The vaselined tube is inserted while the patient exhales deeply, thereby relaxing the parts as much as possible. The handle may be held in position by being inserted between the pages of a very thick book or by an x-ray tube holder.

Fissure of the anus treated in the same manner is invariably followed by a complete cure within ten days, the bowels being kept relaxed in the meantime.

Incontinence of urine due to inability to control the sphincters is generally successfully treated by means of the wave-current. Place a metal electrode eight by six inches shaped to parallel Poupart's ligament to the pubes. Connect this electrode to the positive side of the static machine, grounding the negative. Regulate the spark-gap according to the tolerance of the patient, stopping just short of inducing disagreeable muscular contraction. The treatment should be for twenty minutes, at first daily, and later every other day, depending on the progress of the case. Most cases yield to this plan of treatment within a week; in others it may be found necessary to employ intra-urethral treatment as well, as in caruncles.

Following contusions of the coccyx use a metal electrode about four by four inches, slit midway on each side so it may be bent to conform to parts over the coccyx, a part being held in position over the lower part of the spine, the other part being held firmly in the cleft. Connect the electrode to the positive side of the machine, the negative being grounded. Regulate the spark-gap accordingly. The treatment should be for twenty minutes, daily at first, frequency depending on the progress. Follow the wave-current each time with the application of a few sparks, employing a spark-director directly over the articulation between the sacrum and coccyx. The result from this method of treating coccygodynia is uniformly successful except when a fracture is present.

Let the progressive practitioners of the day but give these methods a trial, and they will surely say "Wonders will never cease; truly, the static has come to stay."

349 W. 57th St.



A CHEAP AND EFFICIENT X-RAY COIL.*

BY MARCUS F. WHEATLAND, M. D., NEWPORT, R. I.

When I discovered that it was impossible to do rapid radiographic work with my 10-plate static machine, I thought of making an induction coil (as the price at which they were selling seemed prohibitive), and I secured all the books and papers I could find upon the subject. My principal sources of information were all the papers published by the Scientific American on coil-making, the works of Norrie, Allsop, and Hare on the construction of induction coils, and the design of a 6-inch coil by Geo. H. Hanchett in *Electrical Designs* (published by the American Electrician Company). Before I was fairly started in the work, I found it absolutely necessary to purchase a coil, but seeing that there was but little information available on the construction of coils which would meet the requirements of x-ray workers, I decided to continue until I had made something suitable, so that physicians who desire, may with a little outlay of time and money make for themselves a coil which would answer all their needs.

The machines described in the various papers and books obtainable were made for use on battery circuits (low voltage) which necessitated more work on my part than was originally anticipated, as the current I was using and which is generally used is 110 volts direct current. I received valuable assistance in the beginning from Mr. D. A. Smith, a graduate of the Massachusetts Institute of Technology, who made the estimates and drawings of the first coil which I constructed. The secondary is practically what it was originally, no change having been made in it, except in the substitution of three sections which were broken down by sparking through into the primary.

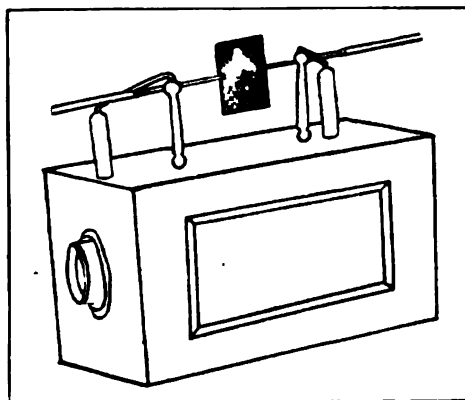
I followed the design of George H. Hanchett on account of its simplicity and because in it the paraffin which permeates all spaces between the sections and joints, and the space between the primary and secondary, offers additional safeguards in these weak places not presented by other methods of construction, for it is here the induction coil generally breaks

* Read before the Sixteenth Annual Meeting of the American Electro-Therapeutic Association, at Philadelphia, September 21, 1906.

down either sparking between the sections or sparking from the sections to the primary. Then again if it proved satisfactory, it would better suit the purpose of the physician because all the parts could be made in the factory, and would take a very short time to assemble and require no outlay for tools except soldering material.

We have had to make many changes in the primary and in the material and sizes of the tube which insulates it from the secondary, and after several experiences have found that mica tube one-half inch thick would permit the close relationship of the primary to the secondary with safety.

The spark length of this coil is 9 inches, which is amply sufficient for all purposes and will operate any tube generally



used. The closeness of the secondary to the primary enables us to get a thick, heavy discharge, which is desirable. After obtaining the sufficient number of turns in the secondary to give the desired voltage to overcome the resistance of high tubes (nine-inch spark being as much as is necessary) the great consideration is amperage; the maximum amount of which is obtained when the secondary sets as close to the primary (well within the magnetic field) as is possible with complete insulation, and the internal resistance of the secondary reduced to the minimum, for which reason no more wire should be used in the secondary than is necessary to produce the desired voltage (spark length). In the majority of coils the secondary is wound in sections 1-10 to 1-8 inch thick. In the method of Hanchett which I have adopted the secondary is divided into

ten sections, the only disadvantage of which I can see is in the cost of replacing a section should it prove unsatisfactory. My machine is designed principally for x-ray work outside of the laboratory and for that reason the exterior is made as simple as possible; of course the physician may add to the exterior whatever suits him best.

The box containing the coil is made of one-inch oak or mahogany; the parts held together by screws re-enforced at the bottom by dowels. Internal dimensions 26 x 10 x 10. In the geometrical center of the end pieces is made a hole five inches in diameter which admits and supports the mica tube. The secondary is supported equidistant around the tube by having its sections slipped over fiber rings 2 1-2 inches long and made to fit snugly within the sections. They are adjusted so that they project 1-4 inch at each end of the section and fit into glass or hard-rubber supports 20 in number and 10 inches square. I cut down my old 10 x 12 x-ray plates for this purpose. To make the 6-inch hole, however, required one who was more familiar with glass-cutting than I.

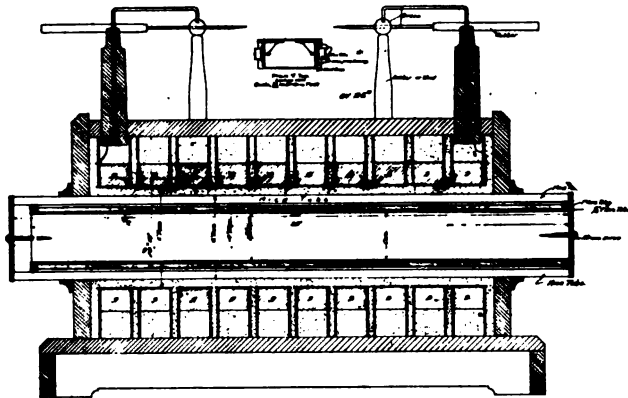
The secondary is composed of 18 pounds of No. 36 silk-covered copper wire, wound in sections 2 inches long; between each layer of wire in the section are two thicknesses of paraffined paper; this is sufficient to insure proper insulation between them.

The winding is carried to within a quarter of an inch of the edge of the paper, insuring against the end turns slipping off and ruining the section. In completing the winding the last turn should end at the other face of the section, opposite the starting point, so that in uniting the sections you may arrange them so that the uppermost part of the coil may have the two wires within easy reach.

Hanchett suggests (on account of cheapness) the use of bare copper wire, with the turns separated by a cotton thread wound between them and the two layers separated as above. I understand that because of the uncertainty of the insulation obtained, the method is discarded by one of the largest electrical works in the country, hence I would insist on silk-covered wire for the secondary.

After winding, each section is placed in melting paraffin and allowed to remain until thoroughly saturated. It is very important in assembling the sections to arrange them so that a

current passing through the secondary, will do so in one direction. If the sections were connected so that the lower end of one joined the upper end of its fellow, it would necessitate the bringing up of the connecting wires between the sections, with the danger of breaking down the insulation between them. This is obviated by so placing the sections that the inside or lower ends will approximate each other and the outside or upper ones likewise; connected up in this manner the current moves through the sections in the same direction and in operation there is no neutralization of effects. The ends should be soldered together using rosin as a flux, as with this there is no danger of its corroding the wires in time. Before soldering I cut the ends to about four inches and instead of twisting up the slack, I stretch the wires along the glass supports and fasten them there with tape. Some suggest taking up the slack by wrapping it around the insulating tube (mica) but to do that would bring the secondary nearer the primary than is intended, there being a half inch of paraffin between the secondary and the mica tube. A good plan is to keep the upper ones on a line with the upper border of the section and



the lower ones in a similar position with respect to the lower turns. There should be a quarter inch space between each section.

We are now ready to fill the box with paraffin. Before this is done have ready a handful of cotton waste with which to tighten the joints around the mica tube and any other space from which the paraffin leaks when poured in. The paraffin will shrink upon cooling and air holes may form which will

require additional paraffin, for which reason it is better to connect the terminals to the binding posts after you are sure that the box is well filled. It will be noticed that these set into the paraffin about 1-4 inch; it is necessary that these terminals be thoroughly imbedded, for should any portion of the wire be exposed, there will be a leaking of the current over the ends into the primary when a high tube is in use. At the same time the wire should not be carried too close to the upper turns of the section for fear of sparking between them.

After a great many trials I have succeeded in making a primary that will stand up under heavy currents. The first four that were made were ruined by sparking where the turns of the second layer overlap those of the first. This is due to the self-induced current which is generated in the primary during operation, being of sufficient voltage to overcome the insulation of the two layers of cotton with which the wire was covered. To obviate this I tried paraffined paper between the layers which I found unsatisfactory on account of the readiness with which it breaks when pressure is made upon it with an uneven surface beneath.

Through the kindness of Mr. Brower, in charge of the winding department of the American Electrical Works, I was informed that from them I could procure oiled linen which would answer better than the paper. Three layers of this between the layers of the primary I have found amply sufficient to insulate them from each other. In no work on induction coils have I been able to find any reference to this difficulty encountered. This no doubt is due to the fact that in the designs given, the coils are intended for use on a battery circuit of low voltage while I was experimenting with the 110-volt direct current.

Of course the winding of the primary can be done at a factory; having access to the use of a large lathe, one may practically make one's own primary. A fiber tube 1-8 inch thick, 32 inches long, outside diameter 3 inches. The inside diameter of 2 7-8 inches, is filled with No. 18 annealed Norway iron cut the length of the tube. There are many directions given for filling the tube, but I have found the following method the easiest: Make a bundle of the wire large enough to enter the tube without difficulty and allow it to go in about one-quarter the way. Make a funnel-shaped space in the center of the

bundle in the tube for the reception of the balance of the wire which you have estimated is sufficient to fill the tube completely; tightly engage this in the apex of the cone and stand the tube on end with the wire up; while an assistant steadies the wire, a few gentle jolts of the tube upon the ground will cause the wire to fall in without difficulty. If it is found that the tube is not tightly filled, the same maneuver is to be repeated, for when the wire is loose in the tube the latter tends to flatten out and thereby change its diameter, oftentimes making it impossible to get the primary into the tube which was intended to insulate it from the secondary. Around the fiber tube are wrapped two layers of oiled linen and over this is tightly wound the primary coil consisting of two layers of No. 10 double cotton-covered wire. As the first layer is put on it is covered with a thick solution of shellac in alcohol applied with a brush; over this are put three layers or wrappings of oiled silk and then is wound the second layer of wire; the end is made fast by the aid of rubber tape and two or three coats of shellac applied. This tends to keep the turns from slipping and is a protection to the cotton insulation of the wire. It is impossible to satisfactorily wind a primary such as we have under consideration without a lathe. Sometimes in winding it is necessary to push the turns closer together; this should be gently done with a wooden tool so as to avoid injuring the insulation. When this happens the point should be covered with two layers of oiled silk; this is to be avoided if possible, as it tends to make the turns irregular and unsightly. Individuals may wind the primary to suit themselves. I find that two layers (one continuous with the other) answer all purposes and simplify matters very much. The primary does not fit closely into the mica tube and in order that it might occupy the center of this, two end collars of 3-8 inch fiber are made, outside diameter 4 inches, inside diameter 3 inches; which fits snugly over the fiber tube on which the primary is wound, and its outside diameter is the exact external dimension of the mica tube. In one of these collars two grooves are made, along which are led the wires from the primary to the binding posts. The primary wire being stiff it is well to connect with solder, close up to the winding, about 18 inches of flexible cable wire.

I run my coil with a Wehnelt or mercury interrupter and it

will answer all the purposes of a high-priced coil. With proper tubes it will take radiographs of any part of the body as rapidly as any other machine. The two end posts being so far apart it was feared that should the sliding rods be connected to these directly, at some time when the coil was running at its maximum capacity, they might be drawn further apart than was safe for the insulation. On this account additional binding posts were placed in front and closer together (11 1-2 inches from center to center), and the current carried over by means of a brass rod. By lifting the rod out of the hole in the brass ball on the forward posts and swinging it way from the post we have the means of a series spark-gap, which can be made as large or as small as desired.

It is well to drill a socket into the screw (to which the terminal wire is fastened) to receive the rod which connects the two posts: this makes a better contact and insures against the odor of burning rubber which is apt to result if the contact between the rod and screw is not perfect.

The approximate cost of material is as follows:

10 sections	\$43.69
10 small fiber tubes or rings for sec.....	2.50
Mica tube	25.00
Oak box	10.00
Fiber tube for primary.....	2.00
14 lbs. of No. 10 copper wire.....	3.25
2 yards oiled linen.....	1.00
Rubber binding posts.....	4.00
Paraffin and small items.....	9.00
	<hr/>
	\$100.44

I obtained the secondary, the wire for the primary, and all the fiber parts from the American Electrical Works at Phillipsdale, R. I.

The mica tube I got from the Mica Insulation Company.

84 John Street.

Editorial.

HOW DOES THE X-RAY AFFECT LIVING TISSUES?

AS stated elsewhere in this issue of the JOURNAL, "clinical experience is greatly in advance of theory," with reference to the action of the x-ray upon normal and diseased tissue. While there seems to be among clinical observers a generally unanimous opinion with reference to the therapeutic indications for the use of the x-ray, there is considerable diversity of views as to the way in which the therapeutic result is accomplished.

There are certain physical effects which will be noticed by most observers. Of these, that of *mass contraction* of a tumor or abscess in the field of irradiation, will be observed. This condition follows the first few short exposures or one exposure of about twenty minutes from the irradiations of a medium tube, employing a medium volume of irradiations.

A series of irradiations induce a retrograde tissue metamorphosis and degeneration, which involves tissues relative to their resistance—the lowly organized tissue yielding, while tissues of greater vitality resist a given degree of irradiation—demonstrating that the action of the ray is inhibitory. The microscopic forms of life perish in the tissues during the process of degeneration—a natural result arising from the changed condition of environment in which they exist, as well likewise from the inhibitory influence upon the germs themselves. There is abundant indication that these irradiations render micro-organisms sterile, as they do the seeds of plants and the higher orders of the mammal kingdom.

The reference made by numerous writers to the local hyperemia produced by the rays, inducing an increased amount of blood into the tissues, with the consequent increased phagocytosis, would not seem to be the most likely reason for the beneficial effect from the therapeutic employment of the ray; for such hyperemia does not appear until the occurrence of the first stage of dermatitis, when the inhibition of nutrition or other action seems to have produced a vasomotor paralysis, while in very many cases, local lesions have entirely disappeared prior to this stage of the process. The retrograde metamorphosis under these circumstances, not of the normal

but of the lowly vitalized tissues, precedes the first appearance of the hyperemia of dermatitis; the absorption of such adventitious tissue elements having given place, prior to this stage, to the normal tissue elements that have formed regardless of the irradiations. The new tissues thus formed have not the energetic quality of the surrounding tissues. For while they have been permitted to develop under the inhibitory influence of the ray, as the abnormal tissue has been absorbed, they lack the energy of tissue that grows under normal conditions. Following suspension of exposures, however, these tissues assume the condition of the surrounding normal tissue. When we understand the physical characteristic of the x-rays to be that of intense ether vibrations, a study of their effects upon living protoplasm may be contrasted with the effects of ether vibrations upon the tissue. The hyperemia induced by the irradiations of the lower frequencies, light and heat radiations, is of a different quality from the hyperemia which arises from the exposures of the ultra-violet and x-ray vibrations of higher frequency and shorter wave length, the former soon disappearing after the removal of the irradiations, while with the higher frequencies a condition simulating a vasomotor paralysis is induced.

The effects upon living tissue in a local field of irradiation are energetic, while upon the cells in the moving blood and lymph streams they are insignificant, except that the channels are narrowed under the stimulating influences which at first induce contraction of vessel walls, slowing the stream, permitting less blood to flow through the tissue. The action of the rays upon the cells, in such a field as stated, is unquestionably an inhibitory one, inducing a condition of impaired metabolism in the structure which they compose. Atrophy takes place with an impairment of function of the organism or organic structure thus exposed, followed later, if continued, by the death of the tissues; any tissue sufficiently exposed passing gradually into a condition of complete lethargy and death, the so-called x-ray necrosis.

Employed intelligently from this point of view, it is possible to lessen the development of hypertrophic processes and excessive secretions; removing or weeding out adventitious tissues, germs, fungi,—structures not a normal part of the organism. This is accomplished with a full knowledge that follow-

ing one or two series of irradiations the tissues will be certain to recover their normal condition, after discontinuance of the exposures, with the germs, fungi, and other elements more or less effectively removed. These observations are in accord with clinical experience and suggest a field of therapeutic indication not so well conserved by any other measure.

If now, it is to be established that by a destructive action upon the germs, or any other cause to which it can be attributed, there is added in accord with the observations of Wright an endogenous introduction of opsonines into the circulation thereby, in accord with recent clinical observations, rendering the economy immune, and removing the infectious element, or by raising the opsonic index as seems to be demonstrated by Gibson and McCullough, another great purpose is conserved by their employment, and the oft noted increase in weight and improvement in general health of patients submitted to treatment by the Roentgen ray is also explained.

* * *

THE SECOND INTERNATIONAL CONGRESS OF PHYSIOTHERAPY.

The Second International Congress of Physiotherapy will be held in Rome, October 13, 14, 15, and 16, 1907. Members of the Committee, Dr. Francis B. Bishop, Washington, D. C., President; Dr. Wm. Benham Snow, New York, Secretary; Dr. Albert C. Geyser, New York, Treasurer. Special Department Committees as follows: Dr. Fred H. Morse, 6 Beacon St., Boston, Mass., Mechanotherapy; Dr. Margaret A. Cleaves, 616 Madison Ave., New York, Phototherapy; Dr. Curran Pope, Louisville, Ky., Hydrotherapy; Dr. M. H. Kassabian, 1831 Chestnut St., Philadelphia, Pa., Radiography; Dr. Geo. C. Johnston, 1646 Denniston Ave., Pittsburg, Pa., Radiotherapy; Dr. Chas. Denison, 823 14th St., Denver, Colo., Climatology; Dr. G. Betton Massey, Professional Building, Philadelphia, Pa., Massive Cataphoresis; Dr. David E. Hogg, 985 Lafayette Ave., Brooklyn, N. Y., Thermotherapy; Dr. Edward C. Titus, 117 West 11th St., New York, Electrotherapy; Dr. William James Morton, 19 East 28th St., New York, Radium-therapy; Dr. Morris W. Brinkmann, 54 West 90th St., New York, Rhythmotherapy.

A SECTION OF PHYSICAL THERAPEUTICS FOR THE AMERICAN MEDICAL ASSOCIATION.

ATTENTION was called in the last issue of the JOURNAL to the fact that a petition would be presented at the next meeting of the American Medical Association looking to the establishment of a Section of Physical Therapeutics as one of the sections of the American Medical Association.

The institution already by the British Medical Association, and the British Academy of Medicine, and ostensibly of the New York Academy of Medicine, of sections devoted particularly to this work, which admit the same in their respective sections, are established precedents.

An argument of this sort should not be necessary in presenting our appeal to a progressive body such as the American Medical Association. There are now a large number of regular practitioners who are devoted to a serious study and investigation of the application of the physical agents to therapeutics, and it is but right that such members of the profession should have an opportunity once annually at the great meetings of the Association, of reading papers and discussing the same in a section especially devoted to the work. If every member of the American Medical Association who is interested will prepare a letter petitioning the Officers and Council of the American Medical Association to advocate or grant the establishment of a section of Physical Therapeutics, at the next meeting at Atlantic City, and forward the same to the editor of this JOURNAL to his address, 349 West 57th Street, New York, the name will be added to the petitions that are being circulated, or if interested members of the profession will send for blanks and circulate such petitions among members of the Association in their communities, such will be forwarded by the Editor.

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FIRST ANNUAL MEETING OF THE AMERICAN SECTION OF THE INTERNATIONAL MEDICAL ASSOCIATION FOR THE PREVENTION OF WAR.

A MEETING will be held in the Hotel Holmhurst, Atlantic City, N. J., June 5th, at 8 p.m., to formally organize the American section of the International Medical Association for the Prevention of War.

A cordial invitation is extended to American physicians, who wish to become members of this Association, to attend this meeting, or to send their names to the undersigned.

The European members of this association comprise some of the most brilliant names in the old countries; Dr. J. A. Riviere, 25 Rue des Mathurins, Paris, France, being the Honorable President.

We cordially invite the profession to be present at this meeting.

DR. WM. BENHAM SNOW, President.

DR. GEORGE BROWN, Secretary.

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AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

SECRETARY'S PAGE.

On Saturday, March 30, the Executive Council held a regular meeting in New York.

The President, Dr. M. W. Brinkmann, in the chair. There were present Dr. Morse from Boston, Dr. Bishop from Washington, Drs. Heuel and Snow from New York, and represented by proxy Drs. Dickson from Toronto and Rockwell from New York.

Amongst other business transacted, several communications were read from various manufactories requesting floor space at our next meeting. These were turned over to the chairman of the arrangements committee, Dr. Morse, who also reported progress for his committee.

The following names were recommended for membership: Dr. Roger S. York, 419 Boylston Street, Boston, by Dr. F. H. Morse; Dr. Samuel J. Harris, 114 Huntington Avenue, Boston, by Dr. F. B. Granger; Dr. William A. White, 461 West 43d Street, New York, by Dr. F. de Kraft; Dr. F. A. Jewett, 282 Hancock Street, Brooklyn, N. Y., by Dr. W. B. Snow; Dr. Percy H. Terhune, 962 Gregory Avenue, Passaic, N. J., by Dr. W. B. Snow; Dr. C. C. Wooster Harris, Bishopville, S. C., by Dr. A. C. Geyser; Dr. Wm. S. Stewart, 406 Linden Street, Pine Bluff, Ark., by Dr. A. C. Geyser; Dr. Sam. J. Kotak, St. Louis; Wellawatto, Colombo, Ceylon, by Dr. A. C. Geyser; Dr. L. A. Sutton, Brewster, N. Y., by Dr. A. C. Geyser; Dr. Wm. J. Perry, Chesterfield, S. C., by Dr. A. C. Geyser; Dr. Sidney A. Twinch, 598 Broad Street, Newark, N. J., by Dr. A. C. Geyser.

A. C. GEYSER,
Secretary.

Progress in Physical Therapeutics.

CONSTITUTIONAL DISEASES.

EDITED BY FRANCIS B. BISHOP, M. D.

Local Treatment by Electric Medication.

The extracts from the communication of Dr. Leduc published in *La Nature*, Paris, on December 29, as taken up in discussion by the lay press, call for certain consideration as to its straight interpretation. In this communication Leduc is quoted as saying that "If we place on each side of the human body a sponge saturated with iodid of potassium, the potassium will penetrate the tissues at the positive pole and the iodid at the negative.

"This simple fact may be the germ of a therapeutic revolution. Up to a recent epoch the introduction of a medicament by the electric current was considered to be a fact of little or no value; now we know it to be easy and regular, susceptible of determining at will local action on the skin and general toxic or therapeutic action throughout the organism, according to the electrolytic solution used, its intensity, and the length of time during which it is applied."

This plain statement of facts by Leduc is misconstrued by the lay press to indicate that drug medication applied in this way becomes strictly local, rendering it devoid of deleterious actions arising when administered by other routes. Undoubtedly the claims of Leduc that the drugs administered in this manner are active in affecting the local cells, is true. It is still a moot question, however, whether very often administrations of this sort are not fraught with the same questionable effects as when administered percutaneously, or through the alimentary canal. Most observers who are now familiar with the employment broadly of the physical agents find that by inducing local and general functional activity, nature is able to rid herself of poisons in the larger percentage of cases without the introduction of any medicament whatsoever. It is a question therefore whether the future of electrical medication to which Professor Leduc refers will not be altogether superseded by the intelligent employment of these agents.

[Editor.]

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

The Induction of Auto-Vaccination in Tuberculosis by the X-rays. By H. D. McCullough, M. B., C. M. A condensed abstract from a paper in the London Lancet of January 27, 1907, Archives of the Roentgen Ray, for April, 1907.

This paper opens with reference to a paper published in the London Lancet of August 25, 1906, by Dr. Peter Patterson on "Observations on the Effect of Sterile Caseous Matter in the Treatment of Tuberculous Disease," in which the writer reported having succeeded in isolating from diseased tuberculous lymphatic glands an immunizing agent with which he vaccinated six patients, suffering from extensive tubercular disease, from which he deduced the following conclusions:

(1) Positive phases of opsonic index without the occurrence of the negative phases.

(2) Each rise in the positive phase was accompanied by minute elevation of the patient's temperature. This elevation served as a reliable guide as to dosage.

(3) The normal index was rapidly reached and easily maintained within normal limits without great variation.

McCullough observes "that such an immunizing agent elaborated in the living organism appears, therefore, to be an ideal vaccine, which it would be impossible to prepare in the laboratory any more than the Jennerian vaccine.

"There is a marked and important difference between the opsonic response evoked by vaccination with this product, and that evoked by the tuberculin of Koch," the latter not being a true vaccine.

"A true vaccine is a metabolic defensive product elaborated *in vivo* by the action of the minute lymphatic glands in the vicinity of the inoculated area. For tubercle, therefore, an ideal vaccine should be one elaborated *in vivo* from the accretion of phagocytized tubercle bacilli obtained from the glands of an animal inoculated with a strain of human tubercle bacillus." He calls attention to the fact that in tuberculous infection varying degrees of accidental infection produce both immediate and remote effects, which when slight may not

appreciably affect the general health, and the local and systematic effect may be so slight as to escape observation, and yet, a different opsonic response has been induced. Repetitions of such slight infections thus produce a partial acquired immunity. It would seem, therefore, that "conditions of environment which conduce to the acquirement of a disease, conduce also to the acquirement of a natural immunity. At the onset of infection there is a definite period of incubation, during which the bacilli adapt themselves to their altered environments, after which they begin to penetrate adjacent structures when the first line of defense of the organism, by lymphatic glandular activity, is called into play. . . . There is hyperemia at the site of infection, elevation, and general temperature and an alternating rise and fall of the opsonic index.

"In the vicinity of the inoculation there is an invasion of two varieties of leucocytes—the phagocytes attacking the tubercle bacilli, whilst another horde of leucocytes weave a neoplastic, encapsulating tissue for the purpose of segregation. The phagocytes attack the advanced guard of scattered opsonized bacilli, while the remaining leucocytes surround and imprison the massed bacilli, thus forming tubercles or enclosed localized foci, pending the development of further opsonines and incitor elements. Following this process, which constitutes the acute stage which is tided over, the changes characteristic of a chronic state set in."

"The enmeshed encapsulated bacilli perish, and their toxins slowly diffused, produce incitor elements, and the leucocytes penetrate the tubercular foci with the ultimate formation of pus." The writer presents another hypothesis in which he supposes that "there are more active foci in which the bacilli have been encapsuled without previous opsonization. These living bacilli may proliferate and emerge; as the result of some bodily exertion they may emerge from their prison and thus cause auto-inoculations with exacerbation of the original malady. To meet such a contingency, however, there has been an elaboration of a tubercle-trophic vaccine in the lymphatic glands in the neighborhood of the original infection. The egress of this vaccine, however, is obstructed at the very moment when it is most needed; the glands are more or less imperviously encapsuled in neoplastic tissue. The happiest results sometimes follow the accidental admission of this vac-

cine into the lymph stream. The surgical ablation of tuberculous glands, for instance, is often followed by the disappearance of other tubercular symptoms, and this may be due to the transudation of a minute quantity of vaccine into the circulation. This is in accordance with the high potency of an infinitesimal quantity of such vaccine when present in the lymphatic gland involved."

At this point the writer states abruptly the conclusion that in a similar manner he believes the x-rays act by setting free the encapsuled vaccine, and states that it is the purpose of this paper to advance the hypothesis that the therapeutic action of the x-rays depends on the induction of auto-vaccination, and this in consequence of the resolvent action of the x-rays on the rudimentary neoplastic tissue, which encapsules the tuberculous glands. This action of the x-rays is followed by a slight rise of temperature, with corresponding increase of the opsonic index, and this without any negative phase.

Dr. Gibson, editor of this department, in a paper read before the American Electro-Therapeutic Association on September 19, 1906, under the title of "Tubercular Antitoxin," was first to call attention to the opsonic action of the x-rays in tubercular infection, and came to his conclusions through much the same process of reasoning as the writer of this paper. He stated in that paper that he had "come to the conclusion from clinical experience that we are causing with x-rays in advanced and suitable cases, a destruction of tubercular bacilli, bacteriolysis, which being absorbed into the blood, the toxin, becoming an endotoxin is very likely to be set loose in the blood and lymph stream, arousing a reaction with production of antibodies or amoceptors of Erlich, or possibly in their own mysterious way, increasing the opsonic index of the individual, even to the point of changing the negative chemiotaxis for an absolute positive chemiotaxis, so that the phagocytosis may be increased sufficiently to take care of all the emergencies that may arise. In other words, in suitable cases you produce by means of x-rays an autospecific or tubercular toxemia, arousing a reaction in the host of the liberated toxins that may be of great benefit to the patient." He also calls attention to the fact that there is a wide difference in the class of cases in which the x-rays have given better results, than cases in which the tuberculin group of agents

are advised. For instance, these agents are recommended to be used only in cases where there is an elevation of temperature. In the cases reported in this article, and the position taken, with reference to the opsonic effects of the x-ray in tubercular processes, this article gives Dr. Gibson distinct priority in having recognized and called attention to the opsonic action of the x-ray. [Editor.]

Dr. McCullough calls attention to the fact that the Roentgen-rays are known to have a specific selective action on morbid tissue, independent of any inflammatory process. This selective action may proceed without any signs of irritation or apparent modification of the integument. In small doses the rays have a stimulating effect on the growth of hair, whereas, with larger doses, vesiculation, ulceration, and sloughing are induced.

He quotes Dr. Lewis Jones as saying that the "gradual onset of radio-dermatitis after a latent period shows that the lesion is a tropho-neurotic one, due to damage sustained by the superficial nerves."

The writer infers that the nerve filaments primarily affected produce paresis of the capillaries, passive hyperemia, analgesia, and finally necrosis. Belot is quoted as follows: "The hyperemia set up by the X-rays provokes an abundant migration of leucocytes from the vessels. The leucocytic infiltration commences at the periphery of the tubercular focus and penetrates by narrow tracks into the substance of the lupus nodules, the leucocytes being ultimately transformed into the fusiform cells of fibrous connective tissues. The lupus cells degenerate by vacuolization; the nuclei lose their affinity for stains, necrose, and become absorbed, and replaced by cicatricial growth."

"The most important point with regard to lupus is the localization of the inflammatory reaction and its concentration exactly at the diseased point, in consequence of the degeneration of the lupus nodules themselves. There is in this respect a resemblance between the action of the Roentgen rays and that of tuberculin, which also sets up inflammatory action which is limited to the tuberculous nodules."

It is well known, moreover, that neoplastic tissue is, in almost every detail, a rudimentary replica of the tissues affected, and such tissues are highly susceptible to the radiations of the Roentgen tube.

He says that for the past two years he has been in the habit of using the x-rays as a resolvent of glandular enlargements with the result "that almost invariably the unsightly disfigurements disappeared with alternate soft swelling and shrinkage.

In the intervals slight toxemia without appreciable rise of temperature occurred, and no symptoms of reinfection were encountered, so that except in early acute cases, there need be no apprehension of that imaginary bogey. "All my cases," he says, "while under x-ray treatment, gained appreciably in weight, and improved in general health, in a remarkable manner. This led to the institution of observations as to the influence of the x-rays on the opsonic index upon a patient with the following results. After suffering from continuous inflammation of both tonsils, in August, 1906, she called attention to glandular swellings on either side of the neck. For several months she had been steadily losing weight, though her general appearance was that of a person in health. The temperature during much of this time had remained subnormal, varying from 96° to 98° F. On September 1, the patient's opsonic index of tubercle bacilli was found to be 0.5. After a series of three short irradiations, the index was 0.95 and after a second series of three irradiations the index was 0.82, which fall was attributed to the menstrual period. The course of treatment was continued until November 26, when the opsonic index was 1.2, or about normal. Two months later, on January 31, the patient's blood serum was again examined with the result that the opsonic index of the unheated blood serum was reported to be 1.03 and that of the heated serum 0.09. Sir A. E. Wright has proved that if repeated examination reveals a persistently normal opsonic power with respect to tubercle bacillus, the diagnosis of tubercle may with probability be excluded.

He concludes the paper by saying that "in the matter of x-ray treatment, clinical experience is greatly in advance of theory," and "ventures to submit these observations in the hope that if confirmed by those who have the necessary facilities for working in this department of therapeutics, they will afford a solid basis for the scientific employment of radiotherapy as well as the proper classification of those conditions, in which its use is indicated."

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Scarlet Fever.

In a recent article published in *Modern Clinical Medicine*, Heubner outlines his method of treatment for scarlet fever. He says that rest in bed during the acute febrile period and continued for one or two weeks afterwards is imperative, great care being taken to prevent undue chilling of the body. This does not, however, preclude the judicious use of hydrotherapy for the fever.

In mild cases with a moderate degree of elevation of temperature, a tepid (90° to 95° F.) sponge bath may be employed once or twice daily. For cases with intense fever and nervous symptoms, he advocates the use of repeated packs the length of which may be extended to an hour without causing a decided internal congestion as in the case of cold baths, which in his experience are not well borne. Two beds are necessary, each supplied with a sheet and woolen blanket. The blanket is first spread upon the bed and upon it the sheet, wrung out of cold water (59° to 60° F.), upon which the naked child is laid enveloped to the neck, first in the sheet then in the woolen blanket, and so allowed to remain for ten to fifteen minutes, depending upon the hyperpyrexia. The author does not state that the child's head is enveloped in a cold turban or ice helmet, this being in the editor's opinion too important an element to be omitted.

In the meantime, the second bed is prepared in a similar manner and the child at the end of the first pack is immediately enveloped in the second pack for another ten or fifteen minutes, and so on four or five times within the hour.

Heubner calls attention to the difference between this method of cooling and a cold bath which is plain, for the sheet warms inside the woolen covering, and between the intervals the blood is called to the surface of the skin and an energetic cooling is the result. [The editor calls attention here to the fact that the writer seems to overlook the enormous advantage that is obtained by these measures in the arousing and stimulating of the central nervous system, enabling it to throw off toxins, and otherwise recover from the lethargy of the infection. The procedure is repeated two or three times daily with intervening periods of rest.]

In cases with marked nervous involvement, cold affusions in a warm bath are of use. Of this method Heubner says: "The duration may be five, ten, or even fifteen minutes in older children and should depend upon the condition of the pulse. The principal indication is the cold affusion. The children are comfortable in the warm fluid, which is from 10° to 12° F. lower than the temperature of their bodies. From a slight height, water cooled by ice (presumably 60° F.) is poured over the head, neck, back, and chest at short intervals, according to the length of the bath, five to six liters being used. The external auditory meatus is closed by plugs of cotton, the parts of the skin on which the cold water is poured are gently rubbed during this procedure, as well as the trunk and extremities which remain in the bath." Each affusion causes deep respiration that cannot be attained by any other method, thus influencing a large area of the lungs. Myriads of reflexes take place, stimulating centers in the medulla and cerebro-spinal axis as well as the sympathetic nervous system. These

baths may be repeated four or even six times daily, after which nourishment is administered, followed by quiet and sleep if possible. Where headache, somnolence, and stupor are present the ice helmet is by far the most satisfactory method of applying cold to the head. This form of treatment need not in any sense interfere with the application of cold compresses to the throat and the spray to the nares with bland and alkaline solutions.

The tissues should be flooded with water, and to this end the child must be given cold water internally at regular intervals and in sufficient quantities to cause free diuresis. To the water fruit juices or alkali may be added; and where the kidneys are thus flushed, scarlatinal nephritis is avoided. It seems to be the general consensus of opinion that water externally and internally is not only of great advantage in the management of scarlet fever but it is probably the best preventive of the ill-effects, complications, and sequelæ of the disease. Where it is used, less medicine will be administered and fewer nervous and kidney complications take place. It will doubtless be gratifying to a large number of physicians whose minds center upon drug administration in this disease, to know that hydrotherapy in no sense interferes with drug medication, but it will be found *per contra* that smaller doses and more certain effects will be obtained. The excellent results secured by those who are familiar with these methods justify one in remarking that the profession is sadly lacking in the use of a simple method of management of a serious infectious disease that can be administered in any farm-house the world over.

The Static High-Frequency Current in Pulmonary Tuberculosis.

Dr. Martin L. Bashinger of York, Pa., presented a very valuable paper with this title before the September meeting of the Medical Society of the State of Pennsylvania, which was afterwards published in the Pennsylvania Medical Journal.

The paper is based upon Dr. Bashinger's experience in the treatment of four cases of pulmonary tuberculosis by means of electrical currents of extremely high frequency and voltage.

While Dr. Bashinger advises that the test of these modalities should be made in incipient cases, the four patients that form the theme of his paper were in the second and third stages of the disease.

The first case was a remarkable demonstration of the value of high-frequency currents in the treatment of this dreaded disease. The patient was a woman thirty-five years of age. The lesion had advanced to cavity formation, hectic fever, profuse expectoration, night sweats, and extreme emaciation. This patient received sixty-three treatments covering a period of four months. At the expiration of one year the disease was

apparently completely arrested. The cough and expectoration had ceased, the pulse and temperature were normal, and the patient had gained twelve pounds in weight. Up to the time of the presentation of the paper there had been no return of unfavorable manifestations.

The second case was of two years' standing. This patient received thirty-one treatments covering a period of two months. During this time he gradually gained in weight, his temperature became normal, he coughed less, and his general condition was in every way favorable. He discontinued treatment and died at the expiration of six months.

The third case was *in extremis* when she began treatments. Nevertheless she received marked relief from distressing symptoms, but died at the end of one month.

The fourth case was that of a physician in the beginning of the second stage. The patient is still under treatment.

The apparatus employed by Dr. Bashinger is a static machine by means of which an inducto-resonator is excited. A series spark-interrupter is made use of, and the application is made by means of a vacuum electrode applied to the chest. This electrode is attached to the Oudin attachment of the inducto-resonator. From the fact that sparks may be drawn from the patient during this monopolar application, whereas, if a metallic plate with a ground connection is applied to the other side of the chest, no disruptive discharge may be drawn from the subject, Dr. Bashinger concludes that the current must penetrate the body.

Dr. Bashinger's observations have convinced him that medicaments used in connection with high-frequency currents are of but little value. He affirms that there is no evidence to prove that these modalities have the power to drive these medicinal substances into living tissue.

This assumption is evidently based upon Dr. Bashinger's experience with these four cases, although he informs us that the pathologist failed to find evidence of material particles in the sputum examined. (In making the assertion Dr. Bashinger ignores the brilliant research work of Borett and Reus as well as the careful laboratory investigations of others in connection with the phenomenon of electric osmosis with currents of extremely high frequency and voltage. In two specimens of sputum submitted to the late Dr. William May, bacteriologist for the city of Syracuse, N. Y., minute material particles were found that Dr. May assured the editor of this department were due to the presence of aromatic resinous substances.)

In regard to the physiological action of these currents Dr. Bashinger believes that the beneficial effect of these electrical discharges is due to the current itself, and not the result of its germicidal effect. He believes that the current chiefly and foremostly stimulates, increases, and maintains the metabolism of the body and improves the pulmonary circulation.

PSYCHO-THERAPY.

EDITED BY LESLIE MEACHAM, M. D.

Suggestion as an Adjunct to Regular Therapeutics. By W. T. Marrs, M. D., Peoria Heights, Ill. St. Louis Medical Brief.

He urges that suggestive treatment should be given by physicians only, since they only can make a proper diagnosis. Suggestion should be given timely and judiciously, when it adds materially to the efficacy of medicine. Suggestion may be given by words, acts, gestures, insinuations,—the patient should be measured, and methods and manners gauged accordingly. Too much talk is calculated to defeat one's purpose. When medicine is given for a certain purpose, the attention of the patient should be called to the fact that he may expect the results. The things we hope for are the ones most likely to be realized. You can expect the best results from psycho-therapy when used to supplement medicine. It often takes a pill to drive down a suggestion. Medicine-taking in the way that it is practised (i. e., without suggestion) is a relic of barbarism. Suggestive methods—by some other name perhaps—will in the future, be employed in the treatment of all perversions and psychoses.

M. A. Bliss, M. D. of St. Louis, in a recent publication, discusses some of the later views of psycho-therapy:

Psycho-therapy in its present development, contemplates a different method from the ordinary "jolly" so freely dispensed and used by unscrupulous quacks and charlatans, and misguided if earnest and well-meaning scientist healers, etc.

It bases its efficacy on a re-education of the reason after a full examination has disclosed as nearly as possible the exact state of the patient, physically and mentally, and must be differentiated from our usual conception of suggestion in that we carefully eliminate any mystery or means that the patient cannot comprehend. It should be kept in mind that psycho-therapy finds its largest application in the psycho-neuroses; that it contemplates exact and complete physical examination and if possible, diagnosis; that pharmaceutical and surgical measures are employed when necessary.—The methods can be employed under any environment but often a rest-cure is of advantage.—The effect of the emotions upon salivation and digestion, blushing as an effect of feeling, lead to a comprehension of how physiological functions may be affected by suggestion. We call attention to the expenditure of force made through the various emotions, which the patient dimly realizes, and we plead for the application of this force to some useful end.

An explanation of how tissues are used up and repaired will

accomplish the step toward correction of the leaks which are draining the patient of his vitality. Oppenheimer uses what he calls psycho-therapeutic letters for patients who are going away or seen infrequently. [The editor has long followed this custom.]

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Physiological Action and Uses of Adrenal Extractives.

In the Monthly Cyclopedia of Practical Medicine for January and February of this year, Sajous offers the theory that the function of the adrenal secretion is the absorbing and carrying of the oxygen derived from the air. The prevailing view that the absorption of oxygen and the elimination of carbon dioxide take place in accordance with the physical laws of diffusion of gases, was shown by Bohr in 1891 to be incapable of satisfactory explanation. At that time he showed that the tension of oxygen was not greatest in the pulmonary alveoli, as was generally considered to be the case, but in the pulmonary capillaries, and that the absorption of oxygen could be explained only by assuming the presence of some sort of internal secretion, capable of taking up the oxygen from the air.

That such a substance exists is supported by considerable evidence. For example, the decolorization of a solution of ultramarine blue when sprayed into the lungs can be explained only by the presence of a powerful reducing substance.

The adrenal secretion, he states, is a strong reducing agent, and moreover, must be present in the pulmonary capillaries as it is secreted directly into the inferior vena cava. From the lungs the adrenal secretion must enter the arterial blood stream, "and considerable evidence," he says, "is available to show that it becomes therein a constituent of the blood plasma and the hemoglobin."

The hemoglobin consists of two substances, its iron-bearing constituent (6 per cent.) and an albuminous body (94 per cent.) of which little is known regarding its function and identity.

During the past ten years there has been repeatedly demonstrated in the blood of vertebrates and invertebrates a substance which is a powerful reducing agent. Its source, nature, and function have remained unknown. It has been termed "oxidase." "The oxyhemoglobin being the blood's oxidizing body, why," he pertinently asks, "should a second substance having the same property be present in the blood stream?" He then goes on to show that the unknown albuminous constituent of oxyhemoglobin and oxidase are alike in certain important chemical and physical properties; and moreover, that these substances and the adrenal secretion have characteristics which go to show that they are all one and the same substance.

In the light of this view oxygen alone is not dealt out by the red cells. They are storage cells for an oxidizing substance, the albuminous content of the hemoglobin, for which they act as carriers in the arterial stream, which they secrete or give up in the capillaries, only to take up again in the lungs when it has again become oxygenized.

According to this theory there should be hemoglobin free in the blood plasma in the venous circulation, in excess of that found in the arterial. It has been demonstrated by Hammarsten that "hemoglobin occurs only in very small quantities in arterial blood; in larger quantities in venous blood," while if it were oxygen alone that the red corpuscles carried and gave up in the capillaries, not only should there be no appreciable amount of hemoglobin free in the blood stream, but the amount in the venous and arterial systems should be equal. He then goes on to show that this conception furnishes a satisfactory explanation of the part that the secretion plays in pathogenesis and of the manner in which it produces its therapeutic effects.

DEPARTMENT OF QUERIES AND ANSWERS.

— CITY, IA., *March 18, 1907.*

DEAR DOCTOR: I have been trying the wave current 6 1-2 to 8-inch spark-gap, 15 minutes every other day, for bilateral goiter in a man about forty. I have given five or six treatments but as yet see no change, the neck measuring 16 inches. My electrode is about 2 x 2 1-2 inches. I am giving calcium iodized gr. jss, t. i. d. and a local application of a preparation containing iodoform, salicylic acid, and oleic acid with which alone I have had success in some cases. Is my technique at fault, or may I expect any result from the wave-current (positive) in this case? It is the first case I have so treated and I inferred from your book that a few treatments would soon make an impression at any rate. My machine is a 16-plate (8 revolving) Betz. The tumor is not very hard, in fact much softer than many I have seen. Patient seems healthy, no indications of exophthalmus, his complexion, however, seems to be peculiarly dark, although he is a stranger to me. . . .

What other treatment besides the knife is efficient in removing a lipomata the size of a hen's to a goose egg? . . .

Do you have binders for the Journal and at what price?

Will you kindly answer briefly the above queries, and oblige an enthusiast in Progressive Therapy.—E. C.

In the case of goiter there was reason to expect from five or six treatments with the wave-current at least the effect of softening of the mass, providing there is a large degree of infiltrate. If, however, the enlargement is hyperplastic, largely made up

of organized tissue growth, there is no reason to expect much from the wave-current, for this current has no action upon the tissue other than to express the infiltrate and institute an active metabolism. The cases to which I referred in my work were early cases of Graves' disease or simple goiter in the stage preceding the development of hyperplastic tissue. I believe that the x-ray is the treatment *par excellence* after an organized tissue growth has taken place. The action of the ray upon this new tissue which is of a lower grade than the normal gland structure, is to gradually resolve it, making elimination possible, thereby reducing the size of the gland, either in Graves' disease or in simple goiter. Exposures should not be made oftener with your static machine than every other day or generally longer than for ten minutes, at ten inches, employing a tube backing a 1 1-2 to 3- inch parallel spark-gap. The exposures should be discontinued at the first appearance of dermatitis. If a coil is used a volume of current should be allowed to pass in a tube of the above resistance which will give the same degree of color of fluorescence as an eight- to twelve- (revolving) plate static machine running at 300 to 400 revolutions per minute. The reduction of these glandular enlargements by this means is truly wonderful. It may take, however, from one to four months to reduce a large goiter to near the normal size. The x-ray may be resumed after a rest of a week or ten days or when dermatitis has disappeared. As a rule in these cases a happy result is hastened if the wave-current is employed on the same days that the x-ray is administered, or mechanical vibration, or both. These measures facilitate the elimination of the resolving adventitious tissue and at the same time causing the gland to contract.

In reply to your other inquiry concerning the treatment of the fatty tumor, I know of no other remedy than the knife.

Binders for the JOURNAL are not furnished by the publisher, but Neumann Bros. of 159 East 59th Street, New York, will bind them for you in half leather for \$1.25 and in cloth for \$1.00 per volume. They do excellent work.

I shall be pleased at some future day to receive your paper on the use of the continuous current. [Editor.]

BOOK REVIEWS.

PARAFFIN IN SURGERY. A critical and clinical study by WM. H. LUCKETT, M. D., Attending Surgeon, Harlem Hospital; Surgeon to the Mt. Sinai Hospital Dispensary of New York, and FRANK I. HORNE, M. D., Formerly Assistant Surgeon, Mt. Sinai Hospital Dispensary. 12mo, 38 illustrations, 118 pages. Surgery Publishing Co., 92 William Street, New York City. Cloth, \$2.00.

This little work covers a field in the practice largely of those who follow cosmetic surgery. The percutaneous injection of

paraffin for the purpose of removing nasal deformities or in cases of depressed scars.

The subject has been treated with a great deal of care both as to technique of employment and preparation of paraffin. Chapters are devoted to the changes which take place in the tissues showing microscopic conditions which are of particular interest. The writers have taken up the subject with care, and quote all the different authorities upon the subject. The work is a very valuable addition to the field of cosmetic surgery.

THE INTERNATIONAL MEDICAL ANNUAL. A Year Book of Treatment and Practitioner's Index. 1907. Twenty-Fifth Year. New York: E. B. Treat & Co., 241-243 West 23d Street. Price, \$3.00.

This volume gives the progress of medical science for the year 1906-7 which manifestly shows, as the editor states, that a revolution is taking place in medical thought. He further predicts that the "present is a period when the practitioner who is not abreast of modern thought will find himself a hopeless straggler in the rear." The present trend seems to be towards prophylactic medicine, and the rapid falling-off in drug medication. Surgery seems to hold the dominant sway, and the discussion of the physical measures receives some attention but far less than properly belongs to the field of therapeutics, which is bound to take the place of drug nihilism. The editor's effort to bring the work up to a high standard is evident, while the excellent personnel of the editorial staff which is made up with but a few exceptions of foreigners, particularly English contributors, does not admit of the consideration of the progress that has been made in physical measures on this continent, where the profession is largely in advance in these subjects of the profession abroad. Otherwise the work is a fair consensus of medical thought and progress. The volume is bound in the usual style, is well illustrated, contains more than 600 pages, and has a good index.

THE PROPHYLAXIS AND TREATMENT OF INTERNAL DISEASES. Designed for the use of Practitioners and of Advanced Students of Medicine by F. FORCHHEIMER, M. D., Professor of Theory and Practice of Medicine, Medical College of Ohio, Department of Medicine of the University of Cincinnati; Physician to the Good Samaritan Hospital; Member of the Association of American Physicians, The American Pediatric Society, etc. New York and London: D. Appleton & Co., 1906. Price, Cloth, \$5.00 net.

This valuable work, which has been written for the use of physicians and advanced students, comes evidently from the pen of a writer of large experience, broad mind, and scientific conception of the application of medical measures to pathological processes. Much attention has been given to prophylactic methods and less attention to drug therapy than in most works of this kind. The writer has also devoted a great deal of attention to hydrotherapy, gymnastics, diet, and exercise, but is

evidently unfamiliar with the uses of electricity, mechanical vibration, the x-ray, and light, as are the larger percentage of teachers at the present time. In so far, however, as the writer has touched upon these subjects, he has manifested a fairness which cannot be said of most medical writers. The writer has covered the whole field of diseased conditions: Section I, treating of Infectious Diseases; Section II, Diseases produced by Animal Parasites; Section III, The Intoxications; Section IV, Constitutional Diseases; Section V, Diseases of the Digestive System; Section VI, of the Respiratory Apparatus; Section VII, of the Circulatory System; Section VIII, of the Blood and Ductless Glands; Section IX, of the Kidney; Section X, of the Bladder; Section XI, of the Nervous System; with an appendix added containing tables of the Composition of Food Materials, Liquors Containing Alcohol, and the General Principles of the Treatment of Poisoning. The work is certainly one of the most comprehensive and scientific of its kind and a valuable addition to the library of the general practitioner as well as the specialist. The work is well bound and contains upwards of 600 pages and has a full index of subjects and of authors quoted.

THORNTON'S POCKET MEDICAL FORMULARY. New (8th) edition, revised to accord with the new U. S. Pharmacopœia. Containing about 2,000 prescriptions with indications for their use. In one leather bound volume. Price, \$1.50 net. Lea Brothers & Co., Publishers, Philadelphia and New York, 1907.

This useful volume is compiled by one well qualified for such a technical, painstaking work, a graduate in pharmacy, a Professor of Materia Medica, and an active practitioner of many years' experience. *Diseases* are arranged alphabetically and the best formulæ for use in complicated as well as simple cases are given with quantities in the ordinary and metric system. A valuable feature of the work is in *Indications* and *Annotations* in the selection of formulæ to meet various conditions. Simplicity, palatability, and compatibility have received attention in its compilation. It has been revised in accordance with the United States Pharmacopœia which eliminates a risk for the physician, the changes from the old to the new and legal standard in the United States Pharmacopœia. This is the eighth edition, which in itself is a recommendation. Its contents includes Tables, Comparative Scales, Important Incompatibles, Poisons and Antidotes, Table of Doses, and Diseases.

The publishers are to be complimented on their work and materials used, which make it an ornamental as well as useful addition to a physician's pocket armamentarium.

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No. 6.

ON THE USE OF THE LESS RADIO-ACTIVE SUBSTANCES IN MEDICINE.*

BY

ROBERT WILSON, M. D.,

Professor of Therapeutics in the University of Bishop's College; Physician to the Western Hospital, Montreal, etc.,

AND

MR. HARRY CALL,

Late Q. M. S. No. 4 Field Co., Canadian Engineers.

Two years ago last March, struck with the therapeutic possibilities of the radiations and emanations of radio-active substances, and hoping almost against hope for the discovery of some method of extraction of the active elements of these substances that would make it a commercial and economic possibility to bring them within the reach of the pockets of the poorest patients, and so render their use on a sufficiently large scale in an institutional clinic possible, I commenced a series of experiments with a comparatively cheap radio-active substance—thorium oxide—and included in the investigation the ammonium and thorium nitrate, uranium nitrate, uranium acetate, and the preparation of thorium which I have called "thorium x."

As you all know, the last two years have been pregnant with the results of laboratory research in this direction; and at the time it seemed that work such as could be undertaken by one not possessed of the highest laboratory equipment, and carried on in the not very frequent intervals of leisure in the work of a busy practitioner, would be of little practical moment, but I am well satisfied with the results, and submit them for your consideration.

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Philadelphia, September 21, 1906.

What I started out to make clear to my own mind was this: what particular ray, frequency, or wave length, was concerned in the therapeutic results obtained clinically when an x-ray tube, or radium, was used. In order that the issues may be intelligently discussed, as well as for the convenience of those among us who may not have followed the subject closely, permit me to review briefly the present status of our knowledge of the different substances and means by which these radiations are obtained.

Radium.—In 1896 the French mathematician, Poincaré, noticing that the x-ray produced fluorescence of the glass tube within which it was generated, wondered whether fluorescence was not always accompanied by the generation of x-rays, or their analogue, as the x-rays produced fluorescence in many substances. Henry and Becquerel taking up the suggestion, began the investigation of substances such as calcium, barium, and zinc-sulphide, which were known to fluoresce, and found that they emitted a non-luminous radiation, as well as the luminous one seen in fluorescence, and that these non-luminous rays were capable of traversing several layers of black paper, and chemically affecting a photographic plate. Becquerel next found that, in addition to the substances named, uranium salts had the same action. But the most important discovery was, as usual, accidental: A plate, carefully wrapped and protected from light, with the uranium nitrate on it, ready to expose to sunlight to induce fluorescence, was, owing to lack of opportunity, not exposed. It occurred to him to develop it, and he found it fogged just as though it had been exposed to the sunlight—here was a radiation independent of fluorescence! Professor Crooks made the next step forward in proving that this radiation came, not from the uranium, but some impurity contained in it. It is at this point that Mme. and Dr. Curie took up the quest. She found that the native impure oxide of uranium (pitchblende) and the impure native sulphide of copper (chalcosite, or chalcolite—the “redruthite” of Cornwall, England) to be more radio-active than any of the others, and to this she devoted her attention. By fusing with sodium carbonate, dissolving the residue in hydrochloric acid, and precipitating with sulphuretted hydrogen, the lead group (lead, copper, bismuth) were extracted. Other metals (iron, zinc, etc.) were removed by suitable reagents, and a radio-active

substance or element associated with barium and sulphur was obtained, and called "polonium" by her. The mixture of barium and radium chloride, remaining after the removal of all other extraneous matter, was next subjected to fractional crystallization. The radium chloride being slightly less soluble than the barium chloride, crystallized first, and contained most of the radio-active element. The ratio seems to be five to one; that is, each crystallization yields a product five times more active than the preceding. This is kept up till an activity of between 1,800,000 and 2,000,000 times that of pitchblende is obtained; this is practically pure radium chloride. Giesel of Berlin finds the bromine salts to crystallize more easily, and has materially lessened the time of production. The amount obtainable from pitchblende is minute, four grains to the ton of residue is the largest yet obtained, while one in ten million is said to be a rich one.

Emanations.—Thorium, uranium, and radium all give off an emanation. It is a true gas, condensable, does not combine, atomic weight 100, may be collected, is diffusible, non-absorbable, and is continually undergoing a change or decay into another gas, "helium," whose atomic weight is 4.

Source of Emanation.—It is notorious that all highly complex compounds, compounds with many molecules complexly arranged, are liable to be unstable, and break down easily. Just as there seems to be a limit to the molecular weight of a substance, so there seems to be a limit to the atomic weight. Thorium, with an atomic weight of 232, uranium 240, radium (estimated) 258,—all these, among the highest atomic weights known, give off emanations.

Rays.—In addition to this emanation, or rather perhaps from this emanation, several kinds of rays are given off. From radium (1) the alpha (α) rays, comparatively large masses, comparable to the size of the hydrogen atom, positively charged; not much deviated by a magnetic field, traveling at a speed of 12,500 miles per second, and supposed to be actual helium particles. (2) The beta (β) rays—exceedingly minute, 1-1000th the size of the alpha particle—negatively charged masses, very easily deflected by a magnetic field (if the radius of a " β " particle be 1-4 inch under a magnetic field, that of an " α " particle would be 11 yards), speed 2-3 that of light, penetrate anything, and chemically affect a photographic plate:

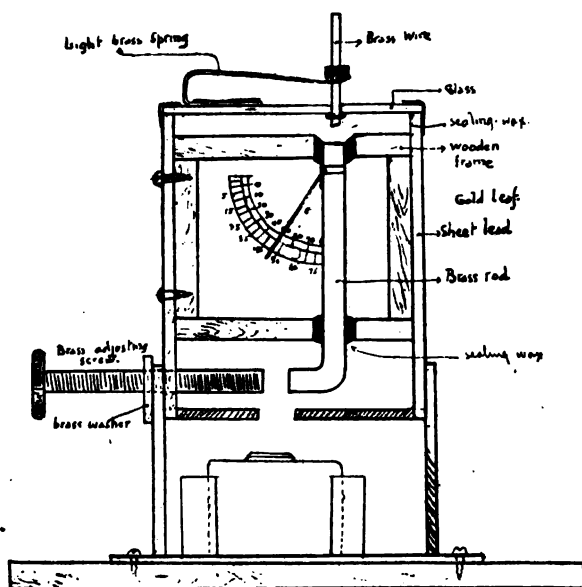
ionize gases less than alpha rays, and are analogous to the cathode rays in a Crookes tube; (3) the "gamma" (γ) rays, do not carry any charge of electricity, are not deviated by a magnetic field, travel in straight lines, do not ionize gases, do chemically affect a photographic plate, and are probably produced by the action of the "alpha" and "beta" rays on surrounding objects. *It is worthy of note here, that if this last statement be true, then the comparative absence of "gamma" rays in thorium and uranium may be due to a difference in the rate of travel or speed of the "alpha" and "beta" rays in these substances, as compared with those from radium, and the cathode stream of a Crookes tube.*

Of the other substances, *uranium* (atomic wt. 240) may be treated with ether, and crystallized out, giving a substance called "uranium x," and about 1000 times more radio-active than the original, but soon losing its strength, gives off "alpha" and "beta" rays, and an emanation, but little or no "gamma" rays. *Thorium* (atomic wt. 232) also gives off an emanation "alpha" and "beta" rays, but so far no "gamma" rays have been noted. Thorium from monozite (phosphate of the cerium group, and a prominent constituent of granitic rocks) containing no uranium, is not radio-active. Baskerville two years ago isolated two elements from thorium—"carolinium," and "berzillium," both radio-active substances.

X-ray Tubes.—Three distinct rays are recognized (though there may be more): (1) "Canalstrahlen," or positively charged particles; probably air molecules, or possibly atoms of gas-constituents of air, or disintegrated air molecules. (2) Cathode rays, infinitely smaller, negatively charged masses (electrons of Thompson) producing on impact (2) x-rays, or Roentgen rays, uncharged rays, not associated with any mass, and probably a true undulation or wave, produced by the impact of the cathode rays on the anticathode or glass.

Ultra-violet Rays from the chemical end of the spectrum, of a high periodicity or rather, frequency, and minute wave length (400 to 162 microns) can be deflected, refracted, and polarized; of poor penetration, easily stopped by paper, destroy the vitality of bacteria, induce inflammatory reaction of the skin; will discharge a negatively charged electroscope, but not a positively charged one; excites fluorescence in willemite (anhydrous silicate of zinc).

Now, the question to decide, in the use of these substances, was, "what particular ray was the effective agent in these therapeutically active substances or means?" and my first experiments were directed towards seeing how these rays therapeutically active, or inactive, behaved (1) chemically, on a photographic plate, and (2) physically, on the ionization of gases. By courtesy of the Auer light company, I obtained some thorium and ammonium nitrate, also some thorium oxide (from mantle powder). By precipitation with the strong solution of ammonia I obtained from the solution of thorium nitrate a clear filtrate, and on evaporation, a fine white powder



Dr. Franklin Electroscope Modified.

containing all the radio-active substances and called "thorium x." A series of radiographs were taken, to determine (1) the length of exposure as compared with radium, (2) the effect of previous exposure to (α) sunlight, (3) a powerful x-ray tube, (4) a comparison with the uranium salts, (5) power of penetrability of the (" β ") rays.

(1) The exposure tests show that at least 6 days are required for thorium oxide to equal 2 hours pure radium.

(2) Previous exposure to sunlight ineffectual.



FIG. 1. Series 1.—Thorium oxide, penny-piece cut out, letters H. C. Exposure 144 hours (6 days).

FIG. 2. Series 5.—Thorium "x"-lead, 1-16" thick. (1) Through paper. (2) Through one-ply tinfoil. (3) Through two-ply foil. (4) Through four-ply foil. Exposure 48 hours.



FIG. 3. Series 5.—Thorium "x." (1) Eight-ply tinfoil, letter "T" cut out. (2) Eight-ply tinfoil cross on paper. Exposure 20 hours.

FIG. 4. Series 6.—Thorium "x." (1) One-cent piece on paper. (2) One-cent piece on four-ply tinfoil. (3) One-cent piece on one-ply tin foil. (4) One-cent piece on two-ply tinfoil. Exposure 48 hours.



FIG. 5. Series 6.—Thorium oxide, coin in purse. Exposure 19 days, 18 1-2 hours.

FIG. 6. Series 6.—Thorium oxide. (1) On paper. (2) On leather. (3) On kid. (4) On chamois. Seven days' exposure.

(3) Previous exposure to x-ray tube shortened time of exposure markedly.

(4) Comparison with uranium salts—nothing distinctive.

(5) Penetration for thorium "x" greater than for thorium oxide, and both effectual for animal tissue (leather) at least 1-8 inch thick in 72 hours—and for at least four thicknesses of heavy lead foil in 48 hours—further, I concluded that the character of radiograph was exactly similar to radium, the length of exposure alone varying.

On comparing the ionizing power with the therapeutically active rays, I made use of a modification of Dr. Franklin's electroscope—see sketch above. It was while we were carrying on these experiments that Dr. Milton Franklin published his article on the electroscope in the New York Medical Record (April 22, 1905). I constructed mine so that the discharging points could be exposed to either radio-active substances from underneath, or to x-rays from the side. Below I give the summary of a very large number of observations. The time given is the discharge time per degree in seconds.

Electroscope empty; points $\frac{1}{8}$ in. apart	} 28 $\frac{1}{2}$ seconds (control test)
Thorium oxide; points $\frac{1}{8}$ in. apart	} 14 $\frac{1}{2}$ seconds
Electroscope empty; points $\frac{1}{4}$ in. apart	} 29 $\frac{1}{2}$ seconds (seven days after last series)
Electroscope empty; points $\frac{1}{4}$ in. apart;	} 17 $\frac{1}{2}$ seconds
24 hours after removal of thorium ox.	
" " 48 " "	
" " 72 " "	28 $\frac{1}{2}$ "
	34 $\frac{1}{2}$ "
Electroscope with thorium oxide; points $\frac{1}{4}$ in. apart	} 20 $\frac{1}{2}$ seconds
" " thorium nitrate	24 "
" " uranium nitrate	21 "
" " " 5 $\frac{1}{2}$ hours with salt in,	16 $\frac{1}{2}$ "
" " uranium acetate	17 $\frac{1}{2}$ "
} shortened time doubtless due to emanation.	
X-ray tube, excited by static machine (high vacuum, little use therapeutically) 12 in. from tube,	0 53 seconds
" with lead shutter on,	4.00 "
" high frequency machine (Strong-Ovington) 12 in. away:	
This tube was therapeutically { low vacuum, no air gap,	7.11 seconds
very active, but scarcely { " 6 in. away	3.00 "
showed bones of hand { " 1 in. air gap	1.30 "

These figures would seem to show that ionizing power and therapeutic efficiency do not go hand in hand; that an x-ray

tube with the greatest ionizing power is least therapeutically useful; that the x- or Roentgen-ray does not seem to have the same effect on living tissue as rays of slightly lower frequency (alpha, beta, and ultra-violet); that the emanation from thorium oxide, and its consequent induced ionization, disappears in from 12 to 24 hours; that the rays analogous to, or corresponding to, the pure x-ray are of little or no importance in radio-active substances, and that as the alpha rays have little or no penetration, it seems inevitable to conclude that the "beta" rays are therapeutically the active agent, and that these are supplied in sufficient quantities in the less radio-active substances at our command, to be clinically available; that we would suggest the employment, especially by those interested in the therapeutics of the skin, of a preparation of thorium oxide, either in thin, flat rubber bags, or made up into an ointment, with lanolin or some substance fairly miscible with water, or used as a powder and applied to the part with suitable bandages. It seems to me to be of little moment whether the radio-active element be kept in contact 15 minutes or 15 days, so long as the final result is the same. I should think in the more chronic skin lesions the method is well worth a trial.

[NOTE.—In the carrying out of this necessarily tedious work, our thanks are due to Major Stuart Howard, C. E., officer commanding the 4th Field Company, Canada Engineers, for facilities needed in the use of our Radio-telegraphy and Mining laboratory.]



LIGHT AND VIBRATION VERSUS OPERATION IN
TWO INTERESTING CASES—PROSTATIC SENILE
HYPERTROPHY AND ONE OF DOUBLE CAT-
ARACT.

BY HOLFORD WALKER, M. D., TORONTO, ONT.

Fellow of the British Gynecological Society.

The results obtained in both cases were so marked, I deem it desirable to draw the attention of the profession to the methods employed, that further investigation may be made and reported.

Case 1. Wm. G., aged seventy-eight, was sent to me for operation, having been obliged to use the catheter during the past three years. On examination found prostate large as small orange, hard as stone, patient unable to void only a few drops of urine on over-distention.

The age, general condition of the patient, together with the extreme hardness of the gland, not holding out very brilliant results by operative procedure, it was decided in consultation with Dr. Burritt, to give the above methods a trial, as in any event, it would tend to soften the gland, and make it more amenable to peeling it out.

The patient received daily applications by the Leuco-descent 500 power lamp, and mechanical vibration, by the Chattanooga vibratory instrument, the former for fifteen minutes, and the latter for three. Results, at the end of three weeks the gland was reduced one-half, and decidedly softer; at the end of seven weeks, nothing remained beyond two soft small lobes only size of marbles.

The light was applied to the perineum for fifteen minutes daily, as hot as could be borne, and mechanical vibration, ball attachment, on alternate days to the lumbar region and with brush attachment to the perineum. On other days directly to the gland with rectal attachment for minute and half.

It may be asked, why not have confined the treatment to one method so as to place results where rightfully belonging, but experience with both has convinced me that they materially aid each other in obtaining results in indicated conditions; and time being a factor, there was nothing to lose, but rather everything to gain by the combined method.

Case 2. Miss T. J. consulted her oculist in consequence of her inability to read as well as formerly; he informed her glasses would not avail as a cataract was forming in each eye, and she must await maturity.

The patient, being very deaf, felt her position and outlook most keenly, and came to me to know exactly what she had to look forward to.

Having seen a report of an incipient cataract being benefited by light, I advised it was worth a trial, but could not promise results. She grasped at the straw, and at the end of four weeks' treatment I sent her to the oculist for a report, and much to my surprise and delight, he reported the right lens perfectly clear; and the left with only a few lines of deposit. At the end of two more weeks' treatment, he reported the merest trace remaining and that it was so trifling that he did not think further treatment necessary. However, I directed another week, and with perfect results.

The light was applied directly to the eyes and cervical region daily for from five to seven minutes; and mechanical vibration with ball attachment on alternate days to the cervical region.

Since writing the above I have received the following report from the oculist as to the condition he found to exist at the time.

"When Miss J. came to me for examination I found that both eyes showed streaked opacities, due to an early stage of cataract, the left more so than the right. The clearer part of the lens was also milky.

"The vision with the best correction by lenses was, right eye $\frac{3}{8}$ and the left slightly less. After four weeks' treatment there was a marked improvement, the clearer parts of the lens being bright, and the streaks thinner.

"After two weeks' further treatment the right eye was perfectly clear, but the left showed several opaque lines. At the last examination, ten days later, both eyes were perfectly clear and the vision of both eyes with proper glasses was $\frac{3}{8}$ both eyes."

54 Isabella St.

THE CHOICE OF METHODS BETWEEN THE USE OF THE ROENTGEN RAY AND THE HIGH-FREQUENCY CURRENTS IN THERAPEUTICS.*

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Gentlemen, to-day I wish to consider the method of choice between the Roentgen ray and the high-frequency currents as applied in Roentgentherapy in the various local and constitutional diseases in which not alone theory, but practice as well, has shown that one or both of these agents exert a marked curative influence.

Before, however, we can, with any degree of satisfaction make our choice between these two agents, we must have a clear idea as to either agent itself as well as to the effect of each produced upon the healthy as well as upon the diseased tissue.

It is an accepted theory in physics that all substances are in constant motion, that is, the molecules and atoms of all substances are in a state of continuous vibration, and the condition of each substance is affected according to the rate of vibration of its molecules.

The molecules of a piece of cold steel have a certain rate of vibration; when, however, this rate is changed or when the molecules move through a greater range of space during the same time, then the condition of the steel is changed as seen in a red-hot piece of metal; in other words, if we so affect the piece of steel by heat as to cause it to become red-hot, its physical properties have changed and the vibrations of its molecules have increased. This normal or fundamental

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Read also at the April meeting of the New York Physico-therapeutic Society.

rate of vibration differs in all substances, and the various rates affect the human organism in different ways.

The human ear can distinguish individual pulsations or vibrations to 16 per second; when the rate of vibrations reaches 30 to 40 per second, they cannot be distinguished separately, but produce a sensation of a continuous sound.

This sensation of sound continuous with rates of vibrations exists anywhere between 16 and 30,000-40,000 per second.

As soon as the vibrations reach beyond 30,000 or 40,000 then there is absolute silence as far as our hearing is concerned. There are, I believe, animals whose ears are so constructed as to hear sounds that the human ear fails to appreciate, but because to us there is silence, these vibrations do not cease; on the contrary, they continue on in one medium or another until they reach 400,000 billions per second, when again we become conscious of their presence, not as sound waves, but as light-waves or vibrations which are capable of making themselves manifested upon the retina of our eyes, and we recognize this rate as light.

There certainly is much food for speculation in the thought that there exist sound waves that no ear can hear, and color waves of light that no eye can see.

The long, dark, soundless space between 40,000 and 400,000 billions of vibrations per second, and the infinity of range beyond 700,000 billions, where light ceases in the universe of motion, makes it possible to indulge in the speculation that there may be beings who live in different planes from ourselves and who are endowed with sense-organs like our own, only they may be tuned to hear and see in a different sphere of motion.

If we take a tuning fork and cause it to vibrate in close proximity to a piano, the same note that was produced by striking the tuning fork will be reproduced upon the corresponding string of the piano, not only that, but every octave of the same will soon respond if the original vibration continues long enough.

On the contrary, if two dissimilar notes are struck at the same time, the stronger will destroy the vibrations of the weaker. Again if two exactly identical tuning forks, but of different size, be struck, then each will assist the other and both will vibrate louder and longer than either could alone.

but let us drop upon one of the legs of either fork a bit of sealing-wax or other substance capable of adhering to it and this fork immediately fails to be influenced by the vibrations of the other fork and is no longer able to vibrate until again restored to its normal condition. This condition of mutual induction and responses to vibrations of the same rate or of its octaves is called sympathy. We know that sound, light, and heat are the results of certain rates of vibrations, we also know that all things, even the living cells of all bodies possess certain rates of vibrations and depend upon these rates for their existence.

We know that the organs of Cortie are so arranged that they become sympathetic or fall in harmony with vibrations anywhere from 16 to 40,000 per second. We know that the eye with its rods and cones is so constructed as to fall in harmony with all rates between 400,000 billion and 700,000 billion. We know that the rays of light and heat, other conditions being favorable, cause the development and growth of the vegetable kingdom; we know that a hen's egg requires a certain rate of vibration in the form of heat for the development of the chick, it does not matter how this heat is furnished, whether by the mother hen or by artificial means, as the incubator; the eggs of fishes and cold-blooded animals are hatched without the mother heat or other artificial sources, yet they all require one thing and that is, a certain rate of vibration to which the cells are capable of responding, for if a cell responds to irritation it will cause it to perform its physiological function; should this rate of vibration be of such a nature, or should the cells be incapable of becoming in sympathy with each other there would then result discord and the stronger vibration would cause the weaker to cease vibrating and death would be the result, for where there is no vibration, there is absence of motion, sound, heat, and light, a combination of all these in one word, means death.

The Roentgen ray is the result of vibration; in fact, it is a certain rate of vibration. To judge from its physical properties we have a right to assume that its rate is much higher and its wave lengths much shorter than those of ordinary light. To reason, then, that certain substances as the air, the ether, photographic chemicals, seeds, plants, as well as the cells making up the human body, could be forced into harmonic sym-

pathy or vibration with it, was certainly more than mere speculation; or, on the other hand, it could easily have been prophesied that should we fail to cause harmonic vibrations to take place between any or all of these substances, that discord and finally silence or death of the exposed substance would be the result. We are not in a position to say which, the living cells or the Roentgen ray, possesses the greater frequency. We have no means as yet of determining whether they are even multiples of each other, but we do know that when living cells are exposed to the influence of the Roentgen ray that we can bring about certain tissue changes, and this tissue change may be anything from stimulation for the performance of physiological function to absolute inhibition of all function. The effect depends entirely upon the tissue exposed, upon the capability of the individual cells responding to the rates of vibration impinging upon them, to the intensity, the time consumed, as well as the behavior of the system as a whole. Clinical evidence furnishes abundant proof that the Roentgen ray, like any other therapeutic measure, possesses a selective power. This selective action is specially manifested in all glandular tissue; in other words, glandular tissue falls under the inhibitory influence sooner than all other tissue, next cells of low resistive power, such as the cells of malignant growths; inhibition takes place in these to such a marked degree that they cease to multiply, in fact degenerate into more simple substances and are absorbed. A most important effect takes place in connection with absorption. The same ray that is intense enough to cause the degeneration of the cells of malignant growths is at the same time the greatest stimulant we possess for the production of normal leucocytes, hence the phagocytic action is markedly increased just at a moment when most required by the system. This phagocytic action is most beautifully shown in all cases where the blood is examined before and after exposure. All patients treated by me for splenic leucemia are examined by Dr. Warren for the blood counts before and after exposure. The therapeutic effect of the Roentgen ray can be compared with the effect of any other therapeutic measure. For instance, take strychnine in doses from 1-60 to 1-30, it acts as a stimulant and becomes a tonic. This continued would cause a general increase in cellular activity, while if 2-3 grains were given as a dose, just:

the opposite effect would be caused—over stimulation and death. This explains the dual action in the treatment of malignant growths: the growth being close to the surface and the tube close to the diseased tissue, over stimulation or death of that tissue results, yet the deeper-lying structure, especially the marrow in the long bones, whence the leucocytes are derived is merely stimulated to greater activity, and for the time a greater number of leucocytes are liberated and phagocytic action increased. I am of the opinion that a patient should receive local as well as general raying at each séance to get the best possible effects.

You will have noticed that I have discarded the term x-ray; this has been done for several reasons, in the first place, the letter "x" has always been used to designate the missing or unknown, but the Roentgen ray can no longer lay claim to that distinction; another and perhaps the more potent reason is the fact, that at the last Roentgen Congress in Berlin it was decided that for uniformity the following terms be used: '

- 1—Roentgenology: The science of the Roentgen or x-rays.
- 2—Roentgenoscopy: Radioscopy.
- 3—Roentgenography: Radiography.
- 4—Roentgenogramm: Skiagram.
- 5—Roentgentherapy: X-ray treatment.
- 6—Roentgenize: To treat by means of x-rays.

While I personally do not approve of these terms, because they fall short of their intention, they are certainly not scientific and other means could have been found, whereby the credit of discovering and bringing to light the real usefulness of these rays should have been properly placed where it rightfully belongs; yet for the sake of uniformity let us abide by the decision of the Berlin Congress.

It is well to call your attention to the two principal means of exciting Crookes' tubes, namely the modern coil and static machine. When the Roentgen ray is used for therapeutic work the static machine is to be preferred; in fact the only reasons why a coil has any preference at all, is because it works during all seasons and atmospheric conditions and has therefore been considered more reliable. But even this one point of superiority is fast losing ground.

We have here in Cornell University Medical College the largest static machine in the country, forty revolving plates;.

there is no reason why this machine should not work every day in the year; any properly constructed static machine can be made to operate under the worst possible atmospheric conditions in from ten to twenty minutes of time by placing on the inside the usual trays containing calcium chloride, or some un-slacked lime, and with these one small tray at either end containing about 2 ounces of acid-phosphate anhydr. The last substance will absorb all the moisture a static machine may contain in from ten to twenty minutes, while either of the other two substances will act more slowly but also with more prolonged effect. When it comes to a question of maintaining tube expenses, and this is of vital interest to you, I am safe in saying that the expenses for maintaining tubes on the static machine range between 1 per cent. and 10 per cent. of that for a coil; ten good tubes should last an experienced operator on the static machine easily one year or more, while on a coil that number will be used up in frequently less than one month's time. The therapeutic effects from a static machine are not only equal to, but much more controllable, therefore much safer in the hands of a beginner. In a large clinic, such as this one, where 15 to 20 patients are treated in the space of a few hours, besides the taking of 8 to 12 negatives for diagnostic purposes, there is not a tube made that would last even one day with the coil, yet on the static machine I have frequently started a tube and not interrupted it for six consecutive hours.

There are, however, certain points in favor of a coil. If properly constructed it is always ready, it takes up much less space than a modern static machine, the work performed by a coil is much more rapid, and by having a coil with three or four primary windings the effect desired can be regulated to a nicety. The greatest room for improvement is in the matter of interrupting devices. In my office I use two interrupters, the Wehnelt for the production of the Roentgen ray and the Cauldwell for use in high-frequency work. Both of these interrupters are of the chemical or electrolytic variety, their greatest objection being due to electrolytic decomposition of sulphuric acid, the fumes of which are rather irritating to the respiratory apparatus.

Either the alternating or the direct current may be utilized for charging the primary of an induction apparatus, yet the

direct current is the current of choice. A very important feature is the winding of an induction coil. After numerous trials I am convinced that the primary of every coil should have at least two or three tapings so as to produce a variable induction. This variable induction is not so apparent in therapeutics, but for photographic purposes it is invaluable. My own coil for office use is so constructed that the primary may be tapped at four different sections. I think, however, that if I had another coil built I would only have three points of tapping. With such a variable induction in the primary and with properly regulated interruptions a tube can be manipulated to suit the various conditions required for radiographic work.

The most important feature in the secondary winding is the manner of locating the points of highest tension. Unless the coil makers are thoroughly conversant with this point the coil is liable to short-circuit itself and burn out. The fact, however, remains that a coil can be wound in such a manner so as to preclude all possibility against this accident. In fact whenever a coil is purchased the maker should furnish a guarantee against the burning out of the coil.

The High-Frequency Current.

This current may be obtained from either a static machine or the regular coil used for exciting Crookes' tubes. In either case an additional instrument is required. We will first consider the coil attachment. The current is conducted from the usual binding posts to an interrupter or spark-gap; from either side of the spark-gap the current is conducted to the inner coating of a pair of Leyden jars; their external coating is short-circuited upon a spiral of a few turns of wire; if now after the jars are short-circuited we continue the spiral for a few more turns, the free end of this continued wire gives us the high-frequency current or the current of Oudin. Practically the same arrangement is used when the high-frequency current is obtained from a static machine. The therapeutic effects from high frequency vary according to the method employed. In dermatology two principal uses are made of this current, that as a superficial stimulant and that as an escharatic.

When the glass vacuum electrodes are used we have a means of securing all grades of superficial irritation, whereby the

local heat and blood supply is increased, which favors growth and repair of local lesions and materially hastens absorption of effete material; the second use is that of an escharotic for the destruction of warts, moles, *nævi*, and such other superficial lesions we employ either a carbon pointed electrode when large surfaces are to be treated or needle points for small growths, the effect is not unlike that of a cautery, but is less painful if properly applied.

You will therefore see that the use of either or both of these agents is clearly indicated in any given case if you bear in mind the physical properties of the agent, the pathologic condition of the lesion and the desire on your part as to what you wish to accomplish.

If you are going to possess only one apparatus it is difficult to choose between the two; personal equation is an important factor here; personally I would favor a properly constructed up-to-date static machine.

We will begin our clinical work with patient No. 1, Mr. J., an inmate of Sailors' Snug Harbor sent to Cornell for Roentgenotherapy. Patient was always well until ten years ago, when he suffered from malaria for which he was treated but did not feel well for two or three years; he then left the malarious district and improved, but three years ago malaria again manifested itself while in California. Gradually his spleen began to enlarge so that now, as you see, the spleen reaches 3 1-2 inches below the umbilicus as well as 3 1-2 inches to the right, nearly filling the entire abdominal cavity, encroaching upon the space allotted to the intestines, stomach, and liver, interfering with the circulation in the great blood vessels and hindering the excursions of the diaphragm. His physical condition can easily be imagined. We select for this case a tube of high resistance, one that will cause the bones of the hand to become transparent at a distance of six to eight feet from the target, we irradiate over the entire abdomen, the tube about twelve inches from the body for ten minutes, the same amount over the back, and repeat this every other day; he has been taking up to 20 drops of Fowler's solution. This we will change to quinine sulph., gr. 2; acid arseniosi, gr. 1-50; methylene blue, gr. 1; restrict all animal food, rectal douche mornings and evenings, at least two hours daily exercise, as a brisk walk in the open.

When this patient came here four weeks ago, the distance he was obliged to travel seemed an obstacle to the treatment, he could not walk more than two city blocks without resting, the elevated stairs were a real hardship; according to his own story now, he enjoys the trip, never pauses for rest, goes up the elevated stairs with ease, and feels better than he has for years; his spleen has decreased 50 per cent. in size, at the same time he has gained 5 1-2 pounds in weight, his blood count is improving each week, and the patient feels as though he had a new lease of life.

Case No. 2.—The patient has suffered from a varicose ulcer of the foot for the past eleven years, the usual routine treatment has been followed, but owing to the fact that this patient cannot afford to go to bed for any great length of time, the treatments have not been very successful; you notice that one-half of the dorsum of the foot shows the extent of the improvement, the other half has a good healthy appearance and in about four to six weeks we hope to have this foot entirely well. In this case we make use of the high-frequency current; we use here the direct sparks from a carbon electrode. This patient is instructed to paint the entire surface with tincture of iodine. In using the carbon-pointed electrode you must apply the point of carbon as close to the diseased tissue as possible; this lessens the pain, and the patient will stand the treatment longer. You notice, those that are near enough, smoke arising from the point of application: this is due to the cauterizing and destructive action of carbon-point spark. If now you were to make use of the Roentgen ray in this case the tissue beneath the hard crust would undergo decomposition, infection would take place, resulting in a case of sepsis.

Case No. 3.—This little girl has suffered from a tubercular ulcer of the ankle-joint for the past four years. When she came here three weeks ago there was a sloughing surface a little longer than the palm of the hand, several sinuses leading to a bone lesion, and the odor was unbearable. She is exposed to a medium tube. If you expose your hands to this tube you will notice that although you are only a few feet from the tube the bones of your hand are dark; even the softer tissues are barely traversed by the ray. I have exposed this lesion for ten minutes at a time, the anode about one-half inch from the lesion, yet no burn has resulted, but cicatrization is

rapidly taking place; she can walk upon the foot without assistance; the sinuses have stopped discharging; there is no odor, and the patient is getting well.

Case No. 4.—This case was referred to this department by Dr. Polk. She has had a second operation for carcinoma of the breast, the resulting scar is certainly all that could be desired. A few months ago, however, a nodule made its appearance in the line of the axillary glands; this became painful; a third operation was not considered advisable. She has been subjected to the irradiation now for four months; three months after treatment the gland disappeared and no new ones have appeared. She returned here for a pain in the arm and shoulder which we have diagnosed as a neuritis. For this she receives the high-frequency current from a glass vacuum electrode over the affected area. This acts as a counter-irritant, and is continued until the part shows a reaction by reddening and a feeling of warmth to the touch; through an impression made upon the terminal filament of the nerve endings, this has entirely removed the pain, and she feels well.

Case No. 5.—This case a young woman, both of whose parents have died of tuberculosis, presented herself to the dermatological clinic where a diagnosis of tubercular ulcer or scrofuloderm of the chest was made. You will notice here over the third rib and about two inches to the right of the sternum, several lesions grouped together as well as some old cicatrices. There were, when she first came under treatment, several small discharging foci; they have all cleared up. We use in this case a tube made entirely of lead glass, except a window about the size of a silver dollar which contains flint glass, and through this window the rays affect the tissues, so that there is no danger of causing reaction anywhere excepting where wanted; this case is getting well rapidly and those of you who have seen this patient in the dermatological clinic can better appreciate the improvement.

Case No. 6.—This patient, a man of nearly seventy years of age, was referred here from the surgical clinic as an inoperable case of epithelioma of the lower lip; the submaxillary glands were enlarged and from a cosmetic point, as well as the age of the patient, precluded an operation. To-day, or only three months after beginning treatment, he shows no trace of his epithelioma, his glands cannot be palpated, and he

is, at least apparently cured; he is now receiving treatments about once in a week from a very high tube. We have never had here a dermatitis or other unfavorable result, he has improved from the very first exposure, and is as you now see him free from all symptoms.

Case No. 6.—This case, referred to me by Dr. Pisko of the dermatological clinic, is of more than passing interest. The patient now twenty-eight years of age; when two or three years old became infected with lupus-vulgaris of the left cheek; this was treated by the usual methods in vogue without effecting a cure. Eleven years ago the lesion was removed by knife and curette, and skin grafting performed with excellent results. About three years after the grafting, however, nodules again made their appearance through the skin. When she came here the entire surface of the cheek was studded with the characteristic apple-jelly nodules which threatened to destroy this previously good result; she was at once exposed to the action of the ray from a lead tube, the window of flint glass touching the lesion; in about four weeks the nodules had all dried up, when the high-frequency current was substituted from a glass vacuum tube applied closely to the lesion for its counter-irritant effect, which causes a peeling or shedding of the superficial layers of the skin, and to-day you see her with a very smooth and healthy scar nearly as soft and pliable as the rest of the face and probably permanently cured; it is well, however, that a case like this remain under observation so that the first symptoms of reappearance may be treated.

Case No. 8.—This case will perhaps show better what may be expected from the Roentgen ray in cases of lupus vulgaris. This patient has had this lesion for over thirty years; all known remedies were used here as well as in London, Eng., where he used to live, but all to no avail. When he came under Roentgentherapy about one year ago his lesion extended from the upper margin of his ear to the malar prominence down to just below the angle of the mouth, covering the entire side of the face to about the middle of his neck. He was treated rather vigorously, and at one time treatment had to be suspended on account of a severe dermatitis; this, however, healed very kindly under the application of lanoline, the only substance I ever use in those cases. To-day you see his lesion entirely healed, he has a soft pliable scar resembling normal scar tissue, which is

being improved daily by the application of the high-frequency current from a glass vacuum electrode, for the purpose of assisting in the absorption of what appears to be a sort of keloid tissue; but if he were never to improve in cosmetic effects, he is cured of his lupus, is presentable, so that he can earn his living and be a useful member of society, instead of being shunned and made an outcast like a leper.

Case No. 9.—This is, or I should say was, a case of acne indurata in a young man twenty-three years of age; he has had the lesion for the past seven years. Since four weeks ago, he has been exposed every other day to a very low vacuum tube until a faint reaction was noticed, which required about ten treatments; the pus formation ceased, the nodules became smaller, and no new ones made their appearance. He was then transferred to the high-frequency current, where he is treated every other day until the entire face shows a reaction by reddening and a sense of increased warmth. This acts as a powerful counter-irritant to the surface which begins to dry and fall off, leaving a smooth pink color on the surface, while the increased circulation promotes the absorption of the deeper-lying nodules, so that to-day there is not a sign of acne left upon his face and he could not wish for a better result; all accomplished in the short space of five weeks.

Case No. 10.—This patient a young woman twenty-one years of age. Five years ago a small nodule made its appearance on the side of the neck resembling an ordinary acne lesion; this was picked and irritated. Finally a small keloid manifested itself; the patient was advised to have it removed by knife, to which she consented. The operation was performed under cocaine anesthesia and seemed a perfect success, but about three to four months later the same keloid made its appearance, only it had increased in size. She was again advised to have a more radical removal performed, with the result as you now see it, a keloid three and one-half inches long. At the New York Polyclinic she was treated for a long time with the x-rays without relief excepting as to pain; nearly all keloids cause a disagreeable drawing sensation, which in many cases amounts to real pain. This patient states that this sensation left her after a few exposures, but the lesion never changed. She was sent to me for treatment with the high-frequency current. In some cases of this kind the high-

frequency current has produced considerable effect; however, the current which is here indicated is the continuous or galvanic current. If the negative pole be placed over the growth and a current as strong as tolerable be passed for fifteen to twenty minutes daily, there is every reason to expect absorption to take place in from four to six weeks.

Case No. 11.—This young woman complains about an unsightly amount of hairs growing upon her chin, upper lip, and sides of her face. When this patient first came under treatment here, her arms were exposed to the action of the Roentgen ray, because they were abundantly covered with the same growth of hair, but as you see her arms are entirely free, not a single hair is to be seen anywhere. Here I wish to impress upon you that each patient is a law unto himself. In this case we never had any dermatitis resulting from the exposures, but instead we had from the beginning a tanning process taking place. This tanning, however, will gradually disappear; in this case the hairs began to fall out after the ninth treatment—each arm received fifteen treatments; we will, however, continue to expose the arms at short intervals while the face is receiving attention. It does not make very much difference whether the static machine or the coil is used in this case. In using the static machine a little more exposure is required than with the coil. A medium soft tube should be used, for penetration is not required; the glandular structure of the skin and all its appendages are very susceptible to the influence of the Roentgen ray. We use a lead tube with a flint glass window about six minutes on each cheek and the chin. The face has only had three exposures; it is consequently too early to look for much reaction. We expect to remove all the hairs from the face, and we will probably have some return in about six weeks to two months after their falling out. These patients are warned against that, and requested to continue the treatment, or upon the first signs of recurrence at once place themselves again under treatment. Prior to this treatment the only sure method was with the constant current; this is rather painful and the process is exceedingly tedious.

Case No. 12.—This young woman, twenty-two years of age, has been troubled with tubercular glands of the neck. Four years ago an operation was done and the diseased glands were

removed, the wound healed by first intention and the remaining scar was perfect. Three years after removal the glands began to enlarge again until, as you see them to-day, the entire side of the neck is swollen and each individual gland can be seen to be from the size of a marble to that of a pigeon egg. This patient's skin is more than usually susceptible to Roentgen ray influence. After the third treatment a slight dermatitis developed, and after the fifth raying some of the hair just above and in front of the ear fell out, so that she has had a bare spot there ever since. That will be avoided in the future, however. As you see we make use here of the lead glass tube, thereby limiting the surface exposed to the desired size only. From previous cases I should judge this case to require constant raying for about three months, exposures to be made every other day of not over six minutes' duration, with the target about one to two inches from the surface, and the tube must be high so as to get deep penetration. These glands will gradually contract without breaking down, the normal contour of parts will be re-established, and to all appearances the patient will be cured.

From the foregoing you will notice that those cases presenting a lesion of over activity, undue proliferation of cellular tissue, especially glandular, should be exposed to the action of the Roentgen ray, while those lacking such conditions are treated with the high-frequency current. In a case of acne, we have an over-production of sebaceous material, due to an inflammation about the sebaceous glands; the Roentgen ray has the property of interfering with this over activity and a drying-up effect is produced usually after six to eight exposures; then it becomes necessary to change to the high frequency current, this acts as a mechanical bombardment, causing at first a contraction of the arterioles which soon becoming over stimulated from their tetanic contraction, reaction sets in and a relaxation of the blood vessels takes place giving rise to hyperemia and local heat. This increases especially the local blood supply and acts much as many counter-irritants or rubefacients would, thereby causing absorption of the effete material and a return to the normal.

In lupus vulgaris the same law applies: during the active stage while there is inflammation and the formation of nodules, caused in these cases by the presence in the lesion of tubercle

bacilli, the Roentgen ray is indicated; when, however, later the active process has ceased and scar or fibroid tissue changes have appeared, a judicious use of the high-frequency current is then indicated.

In the case of epithelioma the same law applies; here we have a proliferation of epithelial tissue to an abnormal degree. This tissue has a low vitality and easily breaks down, hence the Roentgen ray is here clearly indicated. When it is applied it must be applied vigorously. In the case shown here nothing but the Roentgen ray was used, the growth disappeared gradually, there never being any reaction beyond that which was desirable, although the lesion was on the lower lip. As you saw, the patient still wears a full beard, showing that not even a temporary alopecia resulted, yet to-day, after twenty-eight exposures, not a trace, not even a scar is present to indicate the place where the lesion was. As to the permanency of the cure of course only time can tell; I have a large number of cases who have remained well for upwards of five years. One patient with a very large epithelioma of the lower lip, involving nearly one-half of the chin, was apparently cured after forty-two exposures. He was a man aged eighty-seven years; he remained absolutely free during the rest of his life, but unfortunately only lived three years, when he died as the result of an accident.

In cases of *acne vulgaris* or *nodosum*, the results are more lasting, which is of course to be expected, but even here these cases are just as prone to relapse as though they had been treated by any other method. Diet and muscular exercise in the open air are not to be ignored.

At our next lecture we will consider the methods of accurate dosage of the Roentgen ray. Yet I must impress upon you the necessity of close observation, for it is only by practical experience that you will be enabled to make use of this potent agent. It would avail you little to know the exact dose with the most precise instruments of measurement of all the drugs in the *materia medica*, unless you knew equally well the therapeutic indication for the same. Not only the patient exposed to the Roentgen ray, but the attendant as well, comes under the influence of this agent, therefore unless clearly indicated, thoroughly mastered and appreciated, no one should attempt the use of the Roentgen ray, neither upon a patient or unnecessarily expose himself.

Editorial.

THE BROADER CONCEPTION OF RADIANT LIGHT AND HEAT AS A THERAPEUTIC AGENT.

SINCE the arc and incandescent lamps of high candle-power have been placed at the disposal of the profession who have employed them therapeutically, there has been a growing recognition of their value, with a constantly increasing scope of application.

Attention has, however, been directed by observers in recent years to the fact that extreme exposure of white men to sunlight in tropical climates, while for a short period stimulating and energizing, becomes very depressing in its influences upon the white-skinned races who live for protracted periods under the influence of an intense sunlight. By this it is demonstrated that the stimulating influences upon general metabolism are soon followed by inhibitory effects under prolonged exposure. This influence is not due to the action of light upon the skin alone, as is demonstrated from the fact that the *dark-skinned* races do not suffer in the same climate, because the rays of light do not to a large extent penetrate beneath the skin. The fact, however, that the races of the temperate zone have been provided with a light skin, would indicate a provision that would, to a necessary degree, admit the light to the deeper tissues. The influence of sunlight as a requisite of good health has always been recognized as an essential part of environment. The want of a necessary amount of sunlight upon the surface of the body owing to the dark clothing worn throughout most of the year by the inhabitants of the temperate zone will explain some of the conditions which are so commonly observed, such as the effect of defective secretion and absence of normal reaction. This fact is demonstrated clinically by the restoration of these functions with the general improvement of metabolism arising from the employment of radiant heat and light as a therapeutic agent.

It is probable that the beneficial effects attributed to sea-bathing are largely due to the time spent by the bathers while in scant raiment under the direct influence of the sun's rays; the light producing greater beneficial effects than the seawater. Other than the general reflex effects of radiant light

and heat are the benefits derived from the application of concentrated radiations to inflammatory processes either infectious or simple in character. In the former local hyperemia is induced, bringing more blood with more phagocytes into the involved tissues, and at the same time impairing the condition of the germs present, for few if any germs that thrive upon the human economy can withstand high temperatures; light is also unfavorable to most germs, while clinical experience indicates that the leucocytes become active under such influences.

In simple inflammations no agent will afford a more soothing effect than light and heat radiations tempered to a degree of condensation that is just within the bounds of toleration. The relief from pain from such application is recognized, and the curative effect in early processes is remarkable. Neuritis, mastoiditis, sprains, and contusions are remarkably relieved and cured, if employed early and with energy for long periods and repeated on recurrence of pain.

If the surgeon would do a kindness to his patient let him order the application of these intense radiations directly to the skin or even through the dressings following a surgical operation or the opening of an abscess. It will promptly relieve pain and tenderness, promote the healing, prevent commencing stasis, leave a minimum of scarring, and avoid the requirement of other anodynes.

* * *

THE IMPORTANCE OF A CURRENT CONTROLLER ON THE LARGE-SIZED STATIC MACHINE.

THE amperage of current evolved from a static machine having twelve or more revolving plates is sufficiently heavy in many cases when treated by the static wave current to produce under some conditions a degree of fatigue, as in the constitutional treatment when employing a long spark-gap with an electrode over the spine or abdomen of a patient not weighing more than one hundred pounds. After the usual time of administration under such conditions a sense of exhaustion will be present in many cases, which regulation of speed will not prevent.

Intrapelvic cases, as dysmenorrhea or prostatitis, treated

with the wave current derived from these large machines, is very apt to be followed by a sense of soreness, as though the tissues had been overstimulated, with ultimate unsatisfactory results, whereas, in the same cases, the current from an eight-plate machine will be uniformly successful.

Slowing the speed of the machine, nor any other maneuver except altering the character of the grounding, by putting resistance between the machine and the earth, will overcome this difficulty.

These large machines are indispensable in the treatment of patients of large stature or heavy weight, likewise in the practical employment of the high-frequency currents. A systematic method of controlling the output has therefore become indispensable for the regulation of therapeutic dosage in the employment of the currents, by which a machine with a large number of revolving plates may be utilized to cover the whole range of therapeutic indication.

A current controller is described on the last page of this issue of the JOURNAL, which meets these requirements, by placing resistance that can be varied between the earth and the grounded pole of the machine—an adjustment which will regulate to a nicety the current to be administered. The rationale of this device will be appreciated by altering the relation of the groundings of the machine, as by entirely removing the earth connection, or placing the chain upon the floor, and then giving it a direct metallic connection with the earth, and observing the varying current effect. Changing the resistance in this manner, it will be readily appreciated that the output may be controlled to a nicety by a means which will gradually change the connection with the earth's capacity, thereby altering, as can be readily appreciated, the intensity and volume of the resistance. The success or failure in the treatment of various conditions will be fully appreciated by those familiar with the results obtained from machines of varying capacities.

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AMERICAN MEDICAL EDITORS' ASSOCIATION.

THE 38th Annual Meeting of this Association will be held at Atlantic City, on Saturday, June 1st, and Monday, June 3d, with headquarters at the Marlborough-Blenheim Hotel. This active association now numbers nearly 150 members, with many applications in hand for action at the coming meeting. An interesting programme has been prepared.

Progress in Physical Therapeutics.

GYNECOLOGY AND ELECTRO-CHEMICAL SURGERY.

EDITED BY G. BETTON MASSEY, M. D.

The Treatment of Rodent Cancer by Zinc Ions.

This is discussed by H. Lewis Jones, M. D., F. R. C. P., in the British Medical Journal of February 16, 1907, the lecture having been delivered in the Medical Graduates College and Polyclinic in London. Dr. Jones uses the term "Rodent Ulcer" for this condition, a common practice in England, though clearly a misnomer, considering that the disease is slowly malignant and not an ulcer in its first stages. We here give an abstract of the paper:

Of late years the treatment of rodent ulcer has been robbed of many of its difficulties by the discovery of the x-ray and radium, both of which give good results when applied to this condition, but having certain drawbacks, as the extreme high cost of radium and the elaborate apparatus and the attendant risk in unskilled hands, in the use of the x-ray. He states that the method by mercuric ions can be carried out by the ordinary portable battery with results which are quick and good.

The process is based upon the principle of the introduction of zinc ions into the tissues of the ulcer by means of the continuous current which seems to exercise a profound influence upon rodent ulcer, causing it to assume the appearance of an ordinary simple sore, and healing it up in about a fortnight after the application. He presents cases which had been increasing in size slowly for several years. He made an application using a solution of zinc sulphate for a period of twelve minutes. At the expiration of three weeks the ulcer was found to be completely healed and has remained so for more than six months. This case represents the ordinary behavior of rodent ulcer after treatment by the introduction of zinc. The writer's experience has been largely with the treatment of small rodent ulcers of less than one inch in diameter. He gives credit for the origin of the method to Dr. S. Leduc, Professor in Physics at the Medical School at Nantes, who in 1903 published a note on the "Cicatrizization of a Rodent Ulcer of Five Years." After a single application of electrolysis with a one per cent. solution of zinc chloride on a pad of absorbent wool, using a zinc rod and the positive pole, thereby driving

the zinc ions into the tissues of the ulcer, after a fortnight the ulcer had healed except a minute spot at one corner, to which he made another application, when it was completely cured.

Dr. Jones then adopted that plan of treatment with the same success and two years later reported before the Hunterian Society several cases cured by the same method. He has now operated upon nineteen cases, and with the exception of five the results have been successful.

The physics of the process of the zinc ions signifies a condition of the actions of the zinc when one of its salts is dissolved in a solvent like distilled water, and exists in a partially dissociated form, the salt being split up into atoms of zinc carrying the positive charge of electricity, zinc ions and an equal number of molecules of SO_4 , or sulphuric ions having the negative charge. When the conduction of electricity takes place in such a solution or in the tissues of the body it takes place only by the conduction of the electric charges by a movement of migration of ions. In the cases of zinc sulphate the zinc ions with their positive charges move toward the negative pole and conversely the negative charged sulphuric ions move towards the positive pole, so that the electrolysis of the solution of zinc sulphate tends to the concentration of sulphuric acid to the positive pole and the zinc to the negative. This movement of the ions is made use of to introduce them into the body, and that of the positive pole where there is lint or cotton wool imbibed with the solution of the zinc salt and the negative pole is placed on some other convenient part of the body. The zinc will begin to move inwards on its way towards the negative pole.

The writer had been working at the treatment of lupus for nearly two years, but, hitherto, regrets to say, without any great success. "One would expect that lupus might be readily amenable to some form of electrolytic treatment, but the tubercle bacillus contains from 40 to 50 per cent. of fat, and is probably rendered a non-conductor of electricity thereby; possibly the want of success in my attempts in lupus may be due to this fact. Still, by using such compounds as aniline and its derivatives, it may be hoped that better results may be achieved, and I have already succeeded in arresting the disease in a few slight instances by introducing aniline ions from a solution of the hydrochlorate, though I have failed in many others. Nevertheless, I still consider that the electrolytic method of treating lupus is one which deserves careful study from anyone who is willing to devote much time and patience to the task."

It is a singular evidence of the "orientation" of medical observation that the writer of this paper first heard of this method through a French source in a paper dated ten years after the

introduction of the method into surgery by the editor of this department, and eight years after its first publication in the *Medical News* (March 9, 1895). That this first paper of 1895 might have been overlooked is less strange than that the twenty or more subsequent papers on the same subject were also overlooked in spite of their publication as chapters in four widely-sold books, in the *Transactions* of various national and international congresses, and in prominent American medical journals.

This lack of attention in some quarters to western contributions to medicine has other aspects than failure to acknowledge priority of discovery and publication. It results also in a useless repetition of a discarded technic. The blunt electrode and solutions of the zinc and mercury ions were long since abandoned by the writer as less effective than fine zinc-mercury needles. It is to be noted that Dr. Jones was compelled to resort to needles himself in his later cases. An acquaintance with my recent technic would show the incomparable advantage of extremely fine needles in this class of growths, attached to wires no heavier than No. 32 (Brown & Sharpe gauge), the needles being so supported by adhesive plaster guys when in position as to do away with the added pain of a shaky needle. The time that may be gained in beginning the treatment of an extensive rodent cancer by a massive application with many needles under general anesthesia appears also to be yet unknown across the water.

Dr. Jones fails to mention the added action of mercury in this work, though he distinctly states that he employs it by amalgamating the surface of the active electrode. When the active surface of the zinc is thus coated with mercury it should be understood that the ions of both metals are diffused, and the mercury in greater quantity because of its greater affinity for the freed oxygen of the electrolyzed tissues.

But, criticism aside, Dr. Jones' paper is to be welcomed as a valuable contribution to the subject, couched in the clear language of recent electro-chemistry.

CONSTITUTIONAL DISEASES.

EDITED BY FRANCIS B. BISHOP, M. D.

Electricity in the Treatment of Disease. By John D. Schoonmaker, M. D., Kansas City Medical Index Lancet, April, 1907.

The writer calls attention to the importance of recognizing the limitations of electricity in therapeutics, and deplors the extravagant claims made for this valuable therapeutic measure. He calls attention to the fact that the popular notion that electricity is a mysterious life-giving force capable of working miracles on the human body, should be laid aside for a clearer view of its particular actions in therapeutics. He refers to electricity as a source of heat, light, magnetism, and x-rays, also for electro-cautery, and adds that "electricity is always the same in itself but like other agents—it may be given in different dosage and in different ways so that entirely different therapeutic results may be obtained. He calls attention to the fact that success depends upon the personal skill and judgment of the physician employing it, and states that certain cases "such as neuralgia may be treated successfully either by galvanism or static electricity or by the Roentgen rays," according to the skill in employing either by the operator. The uses to which he delegates electricity are as follows:

"1. To produce local necrosis, or an eschar. Limited applications may not go so far as to cause tissue or cell destruction, and may only produce vascular changes, or, in other words, they may act as rubefacients or counter-irritants. Powerful currents, if passed through the body, will, on the contrary, abruptly terminate and abolish all physiological processes.

"2. To disturb the electrical relations of the elements of nerves and muscles. This is shown by muscular contractions, produced when a nerve trunk and a voluntary muscle are brought within the influence of a current of appropriate strength. It is to be observed here that the electricity primarily gives no additional strength to the nerve or muscle, but simply calls into action energy which is already there. However, by its power to call into play the latent energy of the muscle, it causes movements of the muscle, which in turn leads secondarily to increased blood supply and improvement in nutrition. Illustrations of this are very common, as in treating muscular paralysis.

"3. To modify metabolism. Its effects in this direction are well illustrated by the Roentgen apparatus. Exposure to the x-rays causes local nutritive changes in the skin, the lanugo hairs fall out from the operator's hands, the skin becomes

glossy and thin from the atrophy of the glands, chronic ulceration may occur, which in turn may be followed by malignant disease. It has been repeatedly observed that unguarded exposure of the body to the x-rays causes degenerative and atrophic changes in the deeper parts, especially in the fundus of the eye and in the generative organs. In therapeutics this inhibitory and atrophic action may be skillfully directed against cancerous or other new growths. The latter having less power of resistance than normal tissue, are made to undergo retrograde change and to wither away. This is especially noticeable in epithelioma of the skin, and also in accessible organs such as the rectum and mammary gland.

"4. To act as a temporary stimulant to nutritive processes, and especially to the nervous system and the circulatory apparatus. This is illustrated by the good effects upon nutrition produced by the static current and electric bath, in anemia, neurasthenia, atonic dyspepsia, chronic rheumatism, and incipient tuberculosis.

"5. To accomplish certain local effects by stimulating physiological functions. This is shown in the use of electricity to increase the flow of milk from the mammary gland in the nursing woman. The use of the rectal electrode in overcoming constipation I have called attention to elsewhere. The increased function of the ovaries produced by the induced current or by the static spark is very useful in overcoming dysmenorrhea. The systematic application to the scalp causes improved nourishment of hair follicles, and not only prevents baldness, but also actually increases the growth and thickness of the hair.

"6. To destroy parasites upon the surface of the body. Many infectious diseases of the skin caused by vegetable micro-organisms are promptly cured by the x-rays. Among these I may mention tinea favosa, and trichophytina, tinea barbæ, trichorrhæxis nodosa, impetigo contagiosa, acne pustulosa, pityriasis versicolor, lupus (both exedens and erythematosa), and others that will occur to you from the accounts given in the medical journals.

"7. To produce electrolysis. By means of needles introduced into the skin and the passage of a suitable galvanic current, decomposition of fluids and solids occurs, and as a result there may be absorption of new growth. This is utilized in treating keloid or hypertrophied tissue of the nose or throat, and in the destruction of pigmented moles, and the removal of superfluous hair. It also has an application in the treatment of stricture of the urethra by Neumann's method.

"8. To produce intense light. The method, introduced by Finsen, which has been modified by the use of the electric source of illumination, has yielded really remarkable results from its action upon lupus, and on some superficial malignant

growths. The electric-light bath has been vaunted as a great restorative agent, but its utility is doubtful. In its operation the entire body is exposed to several hundred incandescent lights. In studying its effects it is difficult to separate the effects of the heat of the bulbs (which act like a Turkish bath) from the effects of the light itself. We know that light is very irritating to the nervous system, and that the intense sunlight of tropical regions makes these unfit for a permanent residence for white races of men, as shown by Major Charles E. Woodruff of the United States Army in his recent work on the "Effects of Tropical Light on White Men." At all events, the electric-light bath does not act like the electric bath, but simply as a light and heat bath.

"9. To produce high degree of heat. I need not stop to speak of the uses of the galvano-cautery in surgery. It is a complete substitute for the actual cautery, and is superior to it when used as the caustic loop in removing vascular growths on the tonsils, especially in cases of hemophilia.

"10. To produce magnetic effects. The electric magnetic coil is used to extract iron fragments from the eye in surgery. It is also utilized in the electric balance for detecting the location of a foreign body such as a bullet embedded in the tissues.

"The use of the x-ray in photography and in diagnosis, as in the skiascope, does not properly come within the province of the therapeutic applications of electricity. . . .

"Electricity, in most cases, is to be regarded as only an adjuvant to other treatment. While giving the special electric application we should also give appropriate remedies to act upon the glands of excretion and secretion. We should consider the state of the blood and give hematinics to increase the blood corpuscles and hemoglobin, or give antidotes to certain toxins, or eliminants to carry off gouty, rheumatic, or other pathogenic agents, in addition to our prescription of electricity. Massage, exercise in the fresh air, a proper diet, regulation of habits of the individual, all these are accessory agents and should be conjoined with the electrical treatment if we wish to obtain the best results."

In this article the author lays down as a maxim that "In order to obtain the best results in practice it is important to bear in mind the limitations of electricity in clinical medicine."

This is undoubtedly worthy of so able an author, but what are its limitations? We are to-day using many variations of this molecular activity that were unknown fifteen or twenty years ago—each variety producing a mode of motion peculiar to itself—varying as do the different degrees of light—with the intensity and perhaps lengths of its variation in the ether, producing according to its vibrations sedation, stimulant or

tonic effects, and in protoplasm producing anabolic and metabolic action. These are the facts as laid down from the most careful physiological experimentation. Therefore electricity is constructive, destructive, or an equalizer of the physiological changes taking place in the body. These are the limitations, and we have by no means reached the limitations in electro-therapy until we have learned to so use agents we have; not only in aiding us in our diagnostic but in reconstruction—when in our judgment that is necessary. Destructive when indicated, and equalizing the metabolic processes when for some cause they become sluggish, and for removing the cause. Therefore we would suggest that we study the possibilities of electricity rather than its limitations.

By reconstruction is not here meant the reconstruction of tissue destroyed by disease or otherwise; but the restoration of tissue weakened by too active destructive action such as we find in degenerated muscles and nerves, as well as other tissues. We cannot hope to regenerate tissue destroyed by traumatic or inflammatory processes and this is what we believe the writer means, by bearing in mind the limitations of electricity in clinical medicine, but in many cases of organic disease the careful administration of properly selected currents will do much to mitigate suffering and often restore to function organs that have been practically useless.

F. H. B.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Treatment of Leucemia by the Roentgen Ray. J. Belot, M. D.

La Tribune Médicale, August 11, 1906.

He expresses the sentiment, that: "a physician, who deprives a leucemic patient of this method of treatment commits as grave a fault as one who would neglect to give mercury to a syphilitic." He calls attention to the experiment made by many in this disease since beneficial results were first announced by Senn in 1903. He considers the lymphocytes, though profoundly hidden in the visceral organs, much more amenable to the effects of the Roentgen rays than the skin, the reaction being more rapid. He thinks of all affections of the hematopoietic organs chronic leucemia is the most readily influenced and that the results obtained in the myeloid and in the lymphatic leucemia are of the same order. The modifications pro-

duced occur simultaneously in the blood, in the spleen, in the adenopathies when they exist and their influence is shown upon the general condition. The action upon the blood is very striking. Under the influences of well-directed treatment the white globules are progressively reduced to normal. The number of polynuclears gradually surpasses that of the pathological forms. In the myelogenic leucemia the effect is most intense on the myelocytes; and in the lymphoid leucemia of the lymphocytes. He finds, as described by Senn, that the white globules are decreased and the red are increased. The increase in number is accompanied by the increase in hemoglobin and specific gravity, while the greatly enlarged spleen is greatly reduced in size. He notes that the spleen, filling one-half of the abdomen, from the diaphragm to the pubes, even reaching beyond the umbilicus, will resume almost a normal volume in three months' time. Lymphatic gland tumors are also promptly relieved and it is singular the way radiotherapy suppresses fever, when it exists, and the state of apathy and anorexia are also relieved by its influence. He claims that in fifteen days from the commencement of the treatment the most cachectic leucemics show a better color, their appetite improves, the dyspnea becomes less, pains disappear, sleep becomes possible, and strength returns. Albuminuria sometimes disappears very rapidly. He thinks the Roentgen rays constitute a specific treatment for cases of eczema, especially the myeloid type. In pseudo-leucemia the results are variable. In splenomegaly and anemia there is little or no action, while in polyadenitis results are reversed and incomplete. He thinks all patients should go through a routine examination of the blood just like urine, so that the Roentgen ray can be commenced early in these cases.

X-rays and the Genital Glands. N. Y. Med. Jour., May 4, 1907.

"Ancel and Bouin state that the local action of x-rays on the testicle causes a disappearance of the external and seminal secretion with preservation of the internal interstitial secretion and that on the ovary they cause a disappearance of both the external and internal secretion. The results, therefore, of the x-rays on the testicle are the destruction of the procreative power with preservation of the genital activity and the sexual characteristics, while on the ovary the results are sterility and the appearance of all symptoms which follow castration."

Radiotherapy in Facial Neuralgia. Jour. A. M. A., May 4, 1907.

Haret reports a complete cure for two years to date under radiotherapy of a patient of what he calls "epileptiform facial

neuralgia." The patient, a man, suffered from daily recurring attacks of facial neuralgia, not relieved even by morphine. The teeth had been drawn, the trigeminal nerve had been resected and also the superior cervical ganglion of the sympathetic, with a truce of never more than six months at a time after operation. A number of other cases have been treated in the same way with improvement or cure in all but one. The best results are obtained when the pains radiate from one or more points to which the radiotherapy can be applied. The exposures are made weekly, using three Holzkecht units. The first treatment usually causes transient exacerbations of the pain.

Some Applications of the Roentgen Rays in Dermatology.

By Russell H. Boggs, M. D. N. Y. Med. Jour., April 27, 1907.

In this paper Boggs pleads for a more conservative use of the Roentgen rays in dermatology, and insists that more attention be paid to accurate diagnosis and to the pathology of the disease to be treated and to the quality and quantity of the rays with which the condition is treated. He thinks that anyone must understand these factors to be able to use the rays successfully as a remedial agent. He calls attention to the fact of the difficulty in making skiagraphs without experience and with a new machine, but thinks the operator had better spoil the x-ray plates than the patient. Many are able to make an accurate diagnosis but have no idea of the character and dosage required in treating the condition already diagnosed. He is grateful to note that the dermatologists are becoming better recognized, while the x-ray operators are becoming better clinicians. He thinks this will work for the good of both, and that no dermatologist will deny the effect of x-rays in the treatment of acne. Neither should the x-ray operator deny that all predisposing causes should be removed.

Of eczema he gives a graphic description of the various forms, touches on the pathology, and in connection calls attention to the difference in treatment of the various conditions. He decides that the rationale of the Roentgen treatment lies in its stimulation of the metabolic processes, especially in chronic inflammations,—stimulating the bioactivity of the cells. He does not consider that the rays are ordinarily indicated in acute or subacute eczema, unless it be to remove a severe pruritus, but in the chronic and rebellious cases, which resist other therapeutic agents, the rays have proved efficient. In *squamous eczema*, he considers it most beneficial, as it is usually of a very chronic variety. It requires, sometimes, intense radiation to relieve the pruritus and it is prone to recur. He thinks radiation in eczema of the legs should be applied

very differently from the ordinary treatment of squamous eczema. It improves the nutrition in these cases and adds materially to the successful termination. He reports two cases which are very interesting, and a cure is reported in both. He considers that only the very severe and obstinate cases of acne should be treated with the rays.

The reports on *psoriasis* have been very conflicting. One author claims if results are not obtained after two or three exposures, he advises that the rays should be stopped and ordinary methods instituted, while another thinks, as a rule, no results are permanent without an intense use of the rays. The report of the first shows that he knows very little about radiotherapy, for it is known that it takes intense action to produce positive results in *psoriasis*, and that it is then very liable to recur, but the results have been sufficient to demonstrate its usefulness and it should be persisted in with sufficient dosage to master the trouble.

In *keloid*, he considers it the most successful agent known at the present time. It requires considerable time to remove the keloid and the rays should be used of such character as to stimulate the normal tissue processes and promote absorption. He does not think, under ordinary conditions, that a keloid should be removed by operation and then treated with the rays, as the knife is very liable to stimulate the activity of the growth.

He describes *cutaneous tuberculosis* as follows. He describes several forms of the disease, namely: (1) *lupus vulgaris*, (2) *tuberculosis verrucosa*, (3) *tuberculosis cutis orificialis*, and (4) *scrofuloderma*. He deals quite extensively and minutely with the pathology of these four different types, also, giving minute details of difference between the four varieties. He thinks, that in *tuberculosis verrucosa* it is often advisable to remove the growth by electrolysis or the knife and then follow with a few intense radiations to destroy the remaining foci. In *lupus*, he thinks the x-rays are a recognized method of treatment, but must be varied to meet different cases. There are usually two methods of doing it, one by producing a gradual effect and the other by setting up an intense reaction followed by necrosis of the skin. The first is usually preferable. The amount of reaction set up will vary with the disease under treatment. Ordinarily it is useless to produce more than a hyperemia. A slight swelling of the tissue, is always more pronounced in the *lupus nodule*, is accompanied with a certain amount of burning and itching. The congestion is allowed to pass away in a few days when the nodules are decreased in size and the ulcerated portions will cicatrize. This is repeated from time to time when the disease is cured.

The X-ray Treatment of Hypertrophy of the Prostate and its Technique. N. Y. Med. Jour., April 27, 1907.

"Hanisch describes an apparatus by means of which the x-rays may be applied to the prostate while the patient is in the knee-elbow position. He states that he has found the apparatus to be perfectly satisfactory."

RADIOGRAPHY.

EDITED BY HERMAN GRAD, M. D.

The Value of Skiagraphy in the Surgery of the Nose. By W. G. B. Harland, M. D., and H. K. Pancoast, M. D. The Pennsylvania Medical Journal, April, 1907.

The writers call attention to the value of skiagraphy in giving definite ideas of the shape, size, and location of the accessory sinuses, and in indicating the presence or absence of pathological conditions in rhinology. By the x-ray picture the condition of the frontal sinuses as shown by the skiagraph will reveal the presence of sounds, rudimentary conditions, and an estimate of the depth and extent of the sinuses—matters of considerable importance in operable cases. Investigation concerning pathological changes will discover by the comparison of the other side presence of thickened mucosa or pus, or both. The presence of pus can be easily diagnosed from the blurred condition or darkening of the affected side.

"A clear, clean-cut picture of a sinus affords good evidence of its freedom from serious diseases, and in a number of cases we were able by this means to exclude with certainty the presence of involvement in cases referred for an opinion as to the possibility of accessory sinus disease. In other cases in which a number of cells were diseased, we were enabled to learn which sinuses had escaped infection."

"Although probably more definite information can be obtained from the x-ray pictures than from the lights and shadows of transillumination, this method is nevertheless open to some of the sources of error that detract from the value of transillumination, for pictures will be influenced by such factors as thickness of bone, etc. Another difficulty is the fact that cells and sinuses overlies one another in the picture, and this must be allowed for in studying the skiagraphs." Errors also arise from faulty development and it is therefore best in the judgment of the writers that the skiagraph be employed in connection with the examination by other possible means.

Technic.—The secret of success in this work lies in the employment of a high vacuum tube and a diaphragm with plenty

of current and short exposure; also much depends upon careful development of the plate.

For lateral views the plate is held on the diseased side of the head.

For antero-posterior views the plate is held in front and close to the face, the patient lying on the abdomen. The clothing is removed from the neck and the tube is held below the occipital protuberance.

The Value of the Roentgen Rays in Diagnosing Certain Conditions. By A. L. Gray, M. D., Richmond, Va. The Virginia Medical Monthly, April, 1907.

The writer calls attention to the lack of conception by the general physician to the possibilities and limitations of the Roentgen rays, and also mentions certain truths which most of our readers will fully appreciate. He explains the difference between a photograph and a radiograph, showing that the one is a shadow while the other is produced by the passage of rays through a prism, one showing a shadow in a plain surface while the other gives the perspective as well. He also calls attention to the fact that for diagnosis it is important as well that the physician *intelligently read* the radiograph as properly *expose* and develop the same. Surgeons often fail in this particular for want of experience in reading the radiograph. No one who is not familiar with the character of the radiograph and studies it in two planes can come to correct conclusions as to the correct relation of the fragments as of the fractures of long bones. He calls attention also to the fact that the x-ray finding may be only one link in a chain of signs and symptoms which would alone be of no value but along with others makes a clean clinical picture. He discourages the making of prints for patients to show to friends, as it is a source of advertising that is not free from its dangers both for the surgeon in charge as well as the radiographer.

DIETETICS.

EDITED BY SIGISMUND COHN, M. D.

On Chronic Diseases of the Heart and their Treatment. By Theodore Schott, M. D. New York Medical Journal, May 11, 1907.

Under this title Professor Schott read a paper before the medical department of the University of Pennsylvania. In speaking of the physical methods in the treatment of these diseases, he understands by it the mechanical, local, and dietetic therapy. In regard to the latter he wants to forbid the use of

fruit, as such is likely to cause flatulency or difficulty of digestion. All overloading of the stomach should be avoided. The patient should take small quantities of food at frequent intervals, for all presence of interabdominal pressure, or pressing upwards of the diaphragm and subsequent compression of the lungs pushing the heart out of its place,—this is, upwards and outwards,—increases the difficulty with which the function of the heart is performed and accelerates the weakening of this muscle. On the other hand, this should not lead to the insufficient nourishing of the patients suffering from cardiac disease with the idea that the work of the heart is thus relieved. Such patients are sufficiently exposed to the danger of collapse. Even in the treatment of *fatty heart* we must be careful that the body weight is not reduced too rapidly. Otherwise with the fat, the substance of the heart muscle may also disappear, and fatty degeneration may set in. In regard to drinking, it is self-evident that if a large quantity of fluid at one time should be taken the stomach would be over-distended. Effervescent drinks are better avoided. Of course, stimulants in the form of small quantities of wine, or whisky are sometimes necessary. Severe reductions in the quantity of fluid will cause a loss of appetite and disturbances in digestion.

Influence of Diet in the Treatment of Eczema. By A. Ravogli, Cincinnati, Ohio. The Dietetic and Hygienic Gazette, New York, October, 1906.

By physicians of all ages it is known that some affections of the skin are caused by faulty conditions of alimentation. The explanation for this was given as auto-intoxication of poisonous products. Food substances may be toxic (1) on account of decayed condition, (2) on account of improper method of preparation, (3) on account of preserving substances used to prevent their putrefaction. Toxic elements are formed in the stomach and in the intestines through faulty digestive power. From there the toxic elements are carried through the circulation to the skin.

We have also another source of auto-intoxications which are formed in the system from a faulty metabolism. As the skin is an organ of excretion and secretion, it will cause in this way a great deal of irritating products and others that may be eliminated.

1. To prevent the ingestion of food substances which may produce eruptions, it will be necessary to call the attention of the patient to suspicious kinds of foods. Canned goods,—canned soups, and canned beef,—must be considered as suspicious. We must caution our patients against the use of sausages, which are made up too often of meat that has already undergone a process of putrefaction. Individuals who are

often affected by eczema must be cautioned not to partake of food which will expose them to a new attack. They should content themselves with good wholesome home cooking. The articles of food must be fresh and of no questionable nature.

2. With reference to the second point, when products of fermentation are formed in the stomach or intestines we are compelled to ascribe it to diseased conditions in the functional activity of these organs. In these cases, the food must be of such a kind as to agree with the diseased condition of the organs or digestion. Such conditions may be catarrh of the stomach and nervous dyspepsia, or intestinal catarrh, and the food will have to be prescribed according to these conditions.

3. Coming now to the true auto-intoxication, we have to deal with disordered metabolism. Also the production of eczema through the presence of an excess of uric acid in the system has not been positively proved, yet nobody can deny its existence. We know that frequently middle-aged people are suffering from eczema of the feet, legs, hands, etc., and the cause for it is found in too high living. A certain relapsing tendency and a certain obstinacy of eczema is generally recognized, as the eczema of gouty people. The treatment of these kinds of eczema is chiefly by attention to diet. Such patients are used to the drinking of alcoholics, of wines, beers, etc., and are also addicted to excessive smoking or chewing of tobacco. All this is to be forbidden or greatly diminished. The patient does not need to fast, but his food must be plain and easily digested. They need not to abstain from cream and butter and may eat stewed plums, baked apples, or stewed rhubarb. It is a mistaken idea to forbid fruit, raw and boiled, to gouty individuals. The little acid contained in these fruits helps the digestion. Lemonade, fresh salad with oil and vinegar, fresh fruits have never caused uric acid, but large quantities of meat and beer are generally causes of gout. Porridges, gruel, especially for breakfast are to be recommended. Fish, especially fried or broiled, salted mackerel, and all kinds of shellfish must be avoided. Vegetables should be abundant. Pastry and candies are injurious.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

The Physiological Method versus Alcohol and other Drugs as a Means of Regulating Blood-Pressure.

In an interesting editorial by Kellogg in *Modern Science of March*, 1907, the writer takes up the foregoing subject with

the preliminary statement that the implicit confidence which has been placed in alcohol as a stimulant drug has, during the last twenty years, been a-waning with increasing rapidity, until at the present time most of the eminent authorities condemn its use as pernicious and most positively contraindicated in the very cases for which it has for centuries been commended. The writer of this editorial is glad to know that those who have lost confidence are eminent authorities, as it is pleasing to be so classified. By pen and word of mouth, I have endeavored to impress this matter upon my professional brethren. Kellogg's editorial quotes Abel of Johns Hopkins as saying, "So far as experimental evidence goes we may say that alcohol as such, when it is introduced into the circulation with the avoidance of local irritation, is not a circulatory stimulant. In moderate quantities it has also no appreciable effect on the arterial blood-pressure. When a change becomes apparent, it is always in the direction of a fall and not a rise.

"In the early stages of its action it usually causes some degree of flushing of the skin and brain, and later, when very large quantities have been taken, vascular dilatation of the abdominal vessels occurs. It is due to the depressant action of the alcohol on the nervous centers which control the calibers of the arteries, and also in part to the weakened heart."

This latter doubtless shocks the sensibilities of quite a number who have heretofore believed that alcohol or whisky were agents to increase vigor, overcome collapse, and strengthen the individual.

"It cannot be denied that certain stimulant effects frequently accompany the use of alcohol, but these are due, as has now been shown, not to the direct effects of alcohol upon the central nervous system or great vital functions of the body, but are simply the result of the transient irritation produced by this contact with the mucous membrane."

Of this condition Abel speaks forcibly and clearly: "These indirect influences must not be allowed to hide the true character of alcohol, which is always depressant in kind, and which easily gets the upper hand of the effects just noted. In a word, alcohol in respect to its inherent action, when once in the blood and tissues, must be classed with the anesthetics and narcotics. The paralyzing action of alcohol on the walls of the vessels or on the peripheral terminations of the vasomotor nerves in the walls, or by an action on the circulatory centers of the medulla and cord or by a combination of these actions is plain."

Janeway asserts, "Least of all so-called stimulants does alcohol deserve the name. As in animals and normal men it is without influence on the blood-pressure or the force of the heart, so in disease the same holds true." The pharmacologists agree that it produces no rise in the blood-pressure or any

cardiac energy when injected directly into the veins. On the contrary, if a considerable dose is given arterial pressure falls from weakening of both vasoconstrictor centers and heart.

Continuing, Kellogg remarks that, "This fact accounts, in part at least, for the enormous reduction of the mortality when the Brand bath was substituted for milk and brandy. The cold bath raises blood-pressure while alcohol lowers it. Consequently and conversely the cold bath lowers the mortality rate, while alcohol raises it. When we recall the effect that the mortality in the United States alone from typhoid fever amounts to more than seventy thousand persons annually, at least thirty thousand of whom might be saved alive by the substitution of the hydriatic method for the methods commonly employed, it appears to be high time that the facts of exact science which have been worked out by men of world-wide reputation should be utilized in the saving of human life.

"Alcohol is an arch-deceiver. It promises strength and gives weakness; promises warmth but lowers temperature; promises stimulation but produces anesthesia. Alcohol has failed to stand the test of experiment anywhere. The sphygmomanometer has certainly spoiled its reputation as a circulatory stimulant. The experiments of Rhomberg, Crile, and numbers of other investigators have clearly shown superiority of the physiologic method as a means of correcting defects of the pressure-regulating function."

Bath Treatment of Typhoid in Private Practice.

Baruch declares that in the management of a case of typhoid fever the chief aim of the physician should be the enhancement of the patient's resisting capacity to the toxemia which threatens his life. The damage sustained by the nerve centers is the measure by which the mildness or severity of a case of typhoid fever is gauged. Cold baths must not be regarded as cooling procedures. Cold baths prevent lethal complications by reason of their sustaining effects on the central nervous and circulatory systems. The form of the bath and its temperature must be adapted to the condition of the patient.

Hydrotherapeutic Treatment of Chronic Rheumatism.

The treatment employed by Levy may be summed up as follows: The patient is given an electric-light bath, temperature 150° F., duration twenty minutes, to be followed by a circular douche 90° F., duration one minute; this is followed by a Scotch douche to the affected joints, and this in turn is followed by a general massage with special attention to the affected joints or muscles. Three treatments a week are usually sufficient for these cases.

The Treatment of High Blood-Pressure in the Insane.

An editorial in *Modern Medicine* of March, 1907, has the following to say upon the foregoing subject:

"The important study of blood-pressure in the insane, made by Craig, has led to the introduction of hydropathic appliances and methods into many of the leading insane asylums of this and other countries.

"Craig observations showed that in acute mania, the tension is particularly low, while in melancholia the blood-pressure is high. Pressure-raising baths were found of unrivaled value in the treatment of acute mania. Cases which are intractable to all other measures yield to the prolonged neutral bath. The best effect is found from baths of very long duration. A bath of seven to eight hours is common, and sometimes the duration of the bath is made almost continuous for two or three days. Such a bath usually raises the blood-pressure twenty mm. or more. The temperature may be from 92° to 96° or more. The most disturbed patients are quieted by this simple measure; and disturbed cases which cannot be put to sleep by means of hypnotic drugs of any sort, under the influence of a prolonged bath, or the wet sheet pack, sleep quietly for hours and wake greatly improved."

THERMOTHERAPY.

EDITED BY DAVID E. HOAG, M. D.

Physiological Action of Thermotherapy. By Bessie Efner-Fell, M. D. In the *Medical Council* for March, 1907.

Dr. Fell, although experimenting with dry and moist heat, seems to be more in favor of the former, since by the use of more modern apparatus it is comparatively easy of application. The doctor recapitulates the influence of intense dry heat as follows: "(1) to stimulate the circulation; (2) to cause combustion to be more nearly complete; (3) to provide for elimination; and (4) to increase metabolic changes." The writer further states, that since germ growth is rapid at certain temperatures, that if this temperature can be disturbed either by heat or cold the life of the germ is interfered with. While cold will have the same effect as heat in doing this, with cold, metabolism is checked and with heat it is increased. Thus the application of cold decreased the power or resistance, while intense dry heat increases it. Dr. Fell brings to our notice again the fact so often emphasized by the Editor of this department, that we have in the dry hot-air apparatus an inexpensive means of treating certain chronic cases (not malignant), which heretofore have been unsatisfactorily treated and which in many cases we have dreaded to see

come into the office, but can now assure them of benefit. The doctor claims that it is indicated in all cases in which heat has always been indicated; also in some cases where the ice pack and cold sponge baths are used and with better results. Dr. Fell also considers the technique of administering heat by the use of both the local and the body dry hot-air apparatus, but dwells more particularly upon the technique of the body treatment. She describes the apparatus in some detail as well as the treatment after the patient has come away from the apparatus. She speaks of the bad results that are often obtained by too long and improper treatment, the patient being weak and nauseated, with dizziness, etc.

The Editor of this department would suggest such changes in the technique as would be helpful in the cases where bad results have heretofore seemed unavoidable. It must be remembered that the first time the patient takes a treatment there is more or less apprehension and dread. This is not to be wondered at when the intelligent man or woman realizes that water boils at 212° F., and that in the hot air apparatus a degree of heat amounting to 350° or 400° F. is often obtained. This could not be withstood at all if it were not for the fact that proper wrappings were employed and that the heat was intensely dry and free from moisture. It is always a good idea to start the heat under the apparatus for about five or ten minutes before the patient or the part is exposed, thus removing all moisture. The wrappings should be in close contact with the skin at all points, as if there happens to be a place where they are not in contact there a burn will occur, because the moisture will collect—not being absorbed under the intense heat will become hot, when a scald is the inevitable result. Should the feelings of the patient transmitted to you be an inkling of what may occur, it is well to pull the patient out of the apparatus at once, adjust the wrappings more thoroughly, and again proceed. It must be remembered that the good effect of heat, especially dry hot air, is due to a high degree of heat kept up for a short time. In this case we have stimulation only; continued too long as we have depression. The degree of heat as shown by the high registering thermometer in the apparatus, is of little importance as compared with the temperature and pulse of the patient. It has been the practice of the writer in institutional work, with which he has been connected, to let the pulse and temperature be the infallible guide. It should be most closely observed, and should be taken fifteen or twenty minutes after

the patient has been put into the apparatus and every five minutes thereafter. Whenever the pulse counts 120 or the temperature reaches two degrees above normal, it is an indication that the patient has had treatment enough for that particular time. It is usually my custom to allow the patient to remain in the closed apparatus but with the heat turned off for ten minutes, then pull out or open up the apparatus and allow the patient to remain on the table with the wrappings intact for twenty minutes more; then the sponge bath and alcohol rub as suggested by Dr. Fell's paper. The doctor very properly observes that the time will come when your patient will no longer have to seek other parts for a change of climate but can obtain it in your own office.

PSYCHO-THERAPY.

EDITED BY LESLIE MEACHAM, M. D.

The Psychic Treatment of Inebriety and its Relation to So-called Cures. L. D. Mason, M. D., Brooklyn, N. Y. (Journal A. M. A.).

Dr. Mason urges that physicians recognize that "there is an intangible impressionable sensitive, immaterial nature, influenced by material conditions and environments, and that we can depress or elevate them according to our relations with the patient." This will give success in certain classes of mental cases. Orthodox medicine has in the last few years recognized that there is a class of mental disease in which the will power and the mental condition can be greatly influenced and often cured by mental suggestion and various psychic influences. We cannot divorce the psychic from the physical. The study of mankind is man, but we have studied him from the physical, not from the psychic side. Behind the veil of flesh is the real man himself: the sentient, emotional, controlling master of the body. He argues that the reformation of drunkards is wholly due to psychic influences, that all so-called "cures" depend upon their mental influence. They act by affecting the patient's psychic centers and calling out his latent will power. The whole process is to him a "dark séance" over which the glamour of mystery is spread, the potent influence being concealed in the infallible, precious, and mysterious drug. The "infallible cure" promoter acts along psychic lines, using the "cure" as a blind and various measures as decoys to attain his end, meanwhile concealing his ultimate purpose.

TRANSLATIONS.

EDITED BY AMÉDÉE GRANGER, M. D.

The Electrical Sleep. Professor M. Stephane Leduc. La Presse Médicale, February 27, 1907.

Professor Leduc designates under this name a sleep which is analogous to the sleep from chloroform anesthesia; the subject lies motionless, incapable of voluntary movements, does not react to even the most painful stimulation, the respiratory movements, the heart action, and the reflexes alone persisting; this state is produced by the action upon the brain of a certain form of electrical current; it can be maintained for several

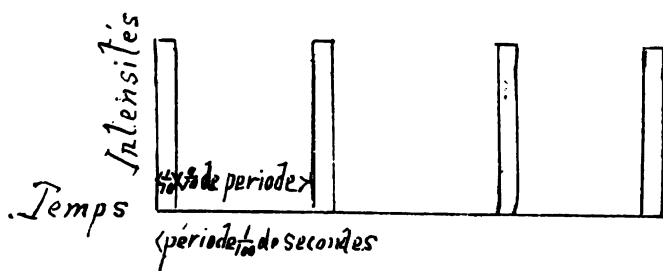


FIG. 1.

consecutive hours and it ceases *instantly* upon the withdrawal of the current.

The current employed to produce this electrical sleep is a special current the result of numerous experiments made by Professor Leduc at the medical school of Nantes, while studying the action of the various forms of electrical energy on the brain, spine, and nerves. It is an intermittent current of low tension, and unidirectional; in other words, a continuous current of low voltage which passes for a given time, ceases to pass, and again passes, the interruptions being at regular intervals. After a very large number of experiments with currents of different frequencies and different periods he found that the best results were obtained with frequencies of 100 per second, and with the current passing for 1-10 of a period; that is the current passes for 1-1000 part of a second 100 times every second (Fig. 1).

To obtain this current he had to devise a special interrupter, which has to be connected to an independent source of electrical energy.

To produce the electrical sleep the circuit was formed by the source of continuous current (preferably secondary cells

or large primary cells of low internal resistance), the rheostat, the interrupter—pole changer, the special interrupter, the milliamperemeter, and the subject—a voltmeter was connected in parallel with the wires leading from the rheostat (Fig. 2).

The heads of the animals were shaven and an electrode 3 x 4 cm. in diameter for rabbits and 5 x 6 for dogs, covered with sev-

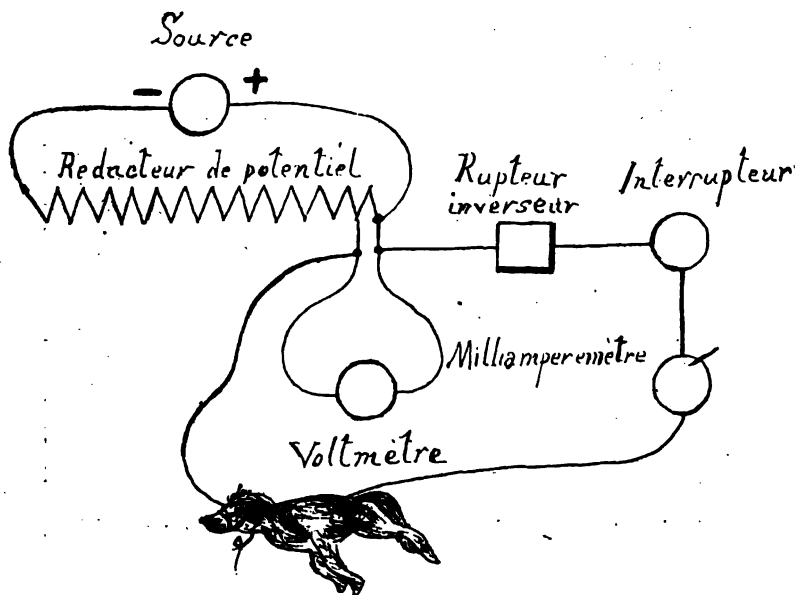


FIG. 2.—Shows Arrangement of Circuit.

eral thicknesses of absorbent cotton soaked in a warm 1 per cent. solution of sodium chloride was applied to the shaven surface extending well forwards immediately over the eyes. The second electrode, size 8 x 10 cm., was placed posteriorly over the lower end of the spine. The large electrode and the surface upon which it was placed were prepared in the same manner as the smaller ones. The negative pole of the battery was connected to the head electrode, the positive pole to the spinal electrode. Everything in readiness the special interrupter was started, and the potential very gradually raised by means of the rheostat, the voltmeter and the animal being watched continuously. When this was properly done, the current having been turned on more slowly as the voltage increased and the state of electrical sleep was being reached, the animal passed slowly and progressively, without a cry, without a movement

of defense or an attempt to run away, without a sign of pain, into a state of cerebral inhibition analogous to the sleep from chloroform anesthesia excepting for the fact that the reflexes are not totally abolished. The animals did not react to any stimulation, were apparently in a profound state of anesthesia, major surgical operations were performed upon them without producing any more reaction than if they had been under profound chloroform anesthesia.

Sleep was produced in the rabbit by using 6 to 8 volts, which gave 1 to 2 ma. in the intermittent; this would correspond to 10 to 20 ma. in an uninterrupted circuit. When the known necessary voltage was turned on at once the inhibition was sudden; the animal fell stiff upon his side; as a result of the generalized contractions, the respiration was suspended; after ten seconds the contractions ceased and relaxation began; after fifteen seconds respiration became reestablished, and the animal could be maintained in that condition for an indefinite period. One rabbit was kept in this state for eight hours and twenty minutes. He survived, and did not seem to have been at all affected by this prolonged experience.

When the experiments were terminated by suddenly withdrawing the current the awakening was instantaneous; in the majority of cases the animal immediately stood on its legs, looked quietly around him without any manifestation of pain, fear, or fatigue. As soon as he was liberated he scampered around and ate with evident appetite what food was offered him.

He had not seen bad after-effects, no nausea or vomiting, very rarely a slight stupor. The experiments did not appear to cause pain, the animals made no attempt to evade the operators, and showed no dread for later experiments. When, after producing the electrical sleep he continued to increase the difference of potential in the circuit he caused first an arrest of the respiratory movements, later arrest of the heart action.

To produce respiratory inhibition in the rabbit it was necessary to use a voltage notably higher than that required to produce sleep; for example, he had to employ ten volts instead of six volts, which would have been sufficient to cause inhibition of the sensibility and motion.

The increased voltage at first caused the respiratory movements to increase in frequency and amplitude, later they became more and more irregular, they diminished in amplitude, became infrequent, irregular, almost imperceptible, finally ceasing.

An abrupt cessation of the current at that time produced a deep inspiration, followed by slow and weak respiratory movements, increasing in rapidity and volume, to remain for a certain time of greater amplitude than normal.

The respiratory inhibition may last one minute before the

heart action ceases; even when this had occurred he was able in eight out of fifteen cases to restore the animals to life by employing for brief periods and at about the frequency of the animals' respiration, the same current which had just caused their death. This caused powerful contractions of all the muscles, including those of respiration.

Respiratory inhibition was produced several times in the same animal without apparent inconvenience or ill after-effects, provided that the animal was allowed to rest for several minutes during the interval between the experiments.

When the current was well regulated, the operation well-conducted, and the animal carefully watched during the establishment of the electrical sleep no deaths occurred. In seventy-four experiments death took place seven times, and each time as a result of pushing the current beyond the voltage required to produce sleep and after having caused respiratory and cardiac inhibition. No ill effects were noticed on the health of animals which had been repeatedly subjected to the electrical sleep.

Professor Leduc concludes from his study of the influence of the electrical sleep upon the blood pressure, temperature, etc., that the electrical sleep, whether produced suddenly or gradually, causes after the oscillations noticed in the beginning a very marked rise in the intracarotidian blood pressure which lasts during the whole time of the electrical sleep; the temperature is rather below normal, the pupils are contracted, the state of the reflexes depends upon the position of the anode; if this is placed on the thorax or abdomen the current does not pass through the spinal cord which is, therefore, not inhibited in its lower part, and the reflexes which are abolished in the face and upper extremities are increased in the lower extremities; if the electrode is placed on the lower part of the spine the whole cord is influenced by the current and is inhibited, and the reflexes in the lower extremities become abolished.

Only one experience to produce cerebral inhibition by means of electricity on man has been made. The subject was Professor Leduc himself.

To produce cerebral inhibition on man it is necessary to have a generator of small internal resistance and furnishing about sixty volts. The apparatus is connected up in the same manner described above. The cathode covered with several thicknesses (9-12) of absorbent cotton soaked in a warm one per cent. solution of sodium chloride, covers the forehead and the temples. The anode, of larger dimensions but of the same material, is placed over the lumbar spine and loins.

It was found useful to cause a continuous flow of current for about five minutes with an intensity of 20 ma. This diminished the sensibility of the skin, lowered considerably the body

resistance, and notably facilitated the cerebral inhibition. This having been done the interrupter is started, the electro-motive force is gradually and slowly introduced into the circuit by means of the rheostat, in a way to attain the required intensity in from four to six minutes.

"The sensation produced by the irritation of the superficial nerves, although disagreeable, is easily borne; after a while it quiets down same as the sensations produced by the continuous current, and after passing through a maximum of intensity, diminishes, in spite of the increase in electro-motive force. The face is red, feeble contractions of the muscles of the face, neck, and forearms are produced, then I felt tingling in my fingers and hands; this tingling sensation extended to the toes and feet; the inhibition affects first the centers of speech, then the motor centers become completely inhibited, the subject is unable to react against even the most painful irritations, and he cannot communicate with the operators.

"The limbs, without being completely relaxed, presented no stiffness.

"The subject complains and sighs, but this is not due to any pain experienced, but seems to be caused by the stimulation of the laryngeal muscles. In the experiments on myself the pulse was not altered at all, but the respiration seemed slightly embarrassed.

"When the maximum current had been reached I still heard as in a dream what was being said around me; I was fully conscious of my impotency to move or to communicate with my colleagues; I felt the contacts, the prickings on the forearm, but the sensations were greatly benumbed. The most painful impression is to follow the dissociation and gradual disappearance of the faculties; the impression is identical with that of a nightmare where in the presence of an imminent danger one can neither cry nor move. However, I could think sufficiently to profoundly regret that my colleagues did not push the current further and complete the inhibition. After our first experience we began anew, this time intending to go further; but this time again my colleagues, thinking the inhibition complete, stopped before causing complete inhibition of consciousness and sensation.

"The electro-motive force used was 35 volts, the intensity in the interrupted circuit was 4 ma. During the two consecutive séances I remained each time twenty minutes under the influence of the current.

"When the current is opened the awakening is immediate; I felt no subsequent effect, unless it be a sensation of well-being and of physical vigor, and immediately after the experiment I proceeded to a meeting which I was to address."

MECHANICAL VIBRATION-THERAPY.

EDITED BY FREDERICK H. MORSE, M. D.

The Vibrator. By H. W. Barnum, M.D. Albright's Office Practitioner, April, 1907.

In answer to an inquiry as to the reliability of the claims of the manufacturers of vibrators, that they produce "stimulation, sedation, inhibition, in any tissue or organ, dissipate engorgements and congestions, with hasty elimination of waste and inflammatory products," he replies as follows: For the induction of stimulation, the vibratode moving in a very rapid manner is applied, starting up a correspondingly rapid succession of impulses, shakings, and vibrations, causing an increase of the activities of the part—a fact long recognized by physiologists, especially by those who use electricity and massage. "The vibrator, much more effective than massage in many cases, simply makes use of the well-known principle." Sudden and vigorous stimulation of the vagus inhibits the heart, which will stop under such stimulation. This nerve is also the secretory and motor nerve of the stomach. Gentle stimulation by applying the vibratode to the front edge of the sterno-mastoid muscle opposite the larynx will cause an increased secretion of gastric juices. In these cases stimulation should always be applied from the second to ninth dorsal nerves, inclusive, the application being made to the lateral processes of the vertebra. The solar plexus and the stomach should also be stimulated by intermittently placing the vibratode deeply into the abdominal walls, which markedly increases the flow of gastric juice, as is verified by the rapid improvement of cases of indigestion submitted to the treatment.

The functions of the liver may be increased by the application of mild vibration to the dorsal centers, from the third to the eleventh inclusive, and deeply over the organ itself, which will always increase the flow of bile.

"Sedation and inhibition are two degrees of progressive action. The former is produced when by continuous vibration to the affected organ we lessen the action. By continuing the vibration to the point of stopping all secretion or pain we induce inhibition."

In *diarrhea*, inhibition is induced by pressing the vibratode over the vagus continuously for three minutes. When applied to both vagi in this manner peristalsis ceases—inhibition. To check the increased secretion apply deep pressure for twenty seconds to each center from the sixth dorsal to the first lumbar nerve inclusive, producing inhibition. Acute cases by this method are cured in one treatment, and cases of chronic diarrhea after a longer period.

In *sprained ankle* with the characteristic conditions present—the stasis and congestion—we should stimulate the return flow to the veins and lymphatics. Beginning at the thigh, slide the vibratode over the tissues towards the abdomen, stimulating and unloading the vessels and glands, working downward towards the ankle, thereby inducing an active circulation to the whole leg. After this apply a soft vibratode to the swollen tissues, always sliding it towards the knee, which in a short time materially reduces the swelling. By repeating this daily for fifteen minutes the cure will be very rapid.

For *congestion of the prostate gland* apply the rectal vibratode directly to the gland with a mild stroke for two minutes, after which stimulate the tenth to the twelfth dorsal nerves to induce contraction of the prostatic blood vessels. Congestion is thereby relieved, and the case cured by a few daily treatments.

He reports results in two cases of *neuritis*. A case of brachial neuritis arising from exposure to the cold had the congestion and characteristic inflammatory stasis. To relieve the engorgements and inhibit the pain, the following method was employed. The vibratode was applied for a minute to each of the centers of the origin of the brachial plexus, with short stroke and increasing pressure as inhibition was obtained, and in the same manner to every sore spot upon the shoulder and arm. Every day the vibratode was moved over the surface of the neck, shoulder, arm, and axilla in the direction of the venous and lymph flow, opening the blocked vessels and glands, thereby promoting increased circulation for drainage of the engorged area. Six daily treatments for 15 minutes resulted in a cure. No relapse for three years.

A recent case of sciatica hobbled into the doctor's office. The skin was exposed over the area of pain, and the ball vibratode applied over the sciatic notch where soreness was found. Medium stroke was applied with increasing pressure as inhibition was obtained. In two or three minutes the vibratode was moved 1-4 inch higher up, and held as before, and continued until all the tender spots were treated, after which the spinal centers to the middle dorsal region were vibrated to include the area at the origin of nerve. The whole treatment required thirty minutes. The following day it was treated twice, much better, and the next day, morning and evening again, when he was almost well, resuming work the next day, and did not return for treatment, but reported himself as entirely well.

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Cases of Tuberculosis Treated with Serum.

Holloway, in the Louisville Journal of Medicine and Surgery, gives his results in fifteen cases. As in the usual methods of treatment, the early cases improved the most, next to them were the cases of moderate severity, while the far advanced cases seemed to be uninfluenced. It is interesting to note that cases of mixed infection were said to be unfavorably influenced. The temporary lowering of the patient's resistance following the injection of the serum, is supposed to render the patient only more liable to the tubercle bacillus. In these cases is the patient also rendered more susceptible to the inroads of the associated microorganisms?

Anti-Bacterial Sera.

The above is the title of a timely article in the April number of the Inter-state Medical Journal, by O. H. Brown.

"Since it was first demonstrated," to quote, "that an antitoxin could be produced (for diphtheria) it seemed possible that other or all diseases might have antisera. . . . The drug-houses, working on this theory, have manufactured antitoxins for a large number of the infections, and have advertised them to the profession as being curative for the respective diseases. The physician who has a large country practice and not time to read the scientific medical literature, may have been led to believe that antistaphylococcus, or antistreptococcus sera were to abscesses or septicemias what diphtheria antitoxin is to diphtheria."

The investigation of these sera, however, by Wright and his associates has shown that in certain cases, at least, such is not the case. A certain antistaphylococcus serum was found highly toxic; antiplague sera lowered the resistance of guinea pigs to plague infections; an antitubercular serum had the same effect upon the opsonic index as a dose of tuberculin. They therefore conclude that a large number of these anti-bacterial sera are in reality vaccines, differing from those usually termed vaccines only in the fact that the diluent of the toxins is serum in place of salt solution.

In conclusion he states that:

1. Some of the so-called antistaphylococcus sera, the antiplague sera, antitubercular sera, and doubtless others, are not antitoxins, but, on the contrary, are toxins.
2. These antibacterial sera, provided they are administered in

the proper dosage and at the proper intervals, may be used in some cases advantageously.

3. Properly-made vaccines should be recommended as substitutes for these antibacterial sera, which are not antibacterial, but toxic in property.

4. The vaccines and (antibacterial sera?) are most safely administered when controlled by the opsonic index.

Vaccine Treatment of Tuberculosis in Children. Clive Riviere. *British Medical Journal*, April 13, 1907.

From his experience, he concludes that the dose of inoculation should be small, 1-4,000 mg. to 1-12,000 mg., according to the age of the patient. Larger doses produce too prolonged a negative phase. The subsequent inoculation should be given while the index is high, instead of waiting for the resistance to fall below normal. Individual idiosyncrasy should be considered, and the possibility of sudden increase in susceptibility be borne in mind. Therefore the necessity of determining the index after as well as before each injection. All cases should have quiet enforced for a day or two after injection, and those in whom the lesion is not localized should remain quiet during the continuation of the treatment on account of the fluctuation in the index produced by the autoinoculation due to exercise. Inoculation during acute intercurrent illnesses should be avoided. Synopses of a number of cases are presented.

Antitubercular Lymph Compound: A Contribution to the Organotherapeutic Treatment of Tuberculosis.

Gilliford B. Sweeney, *Charlotte Medical Journal*, advocates the use of a specially prepared compound. From bullocks free from tuberculosis is made a mixture composed of contents of the thoracic duct, extract of brain and spinal cord, and spermatic fluid. To this sterilized mixture are added the chlorides of gold and sodium, grs. 1-60 to the dose. The preparation is given by injection, intermuscularly, every second day, every day, or twice a day, "according to the exigencies of the case." It exerts its action through the "immunizing action of the lymphocyte," its "antitoxic influence," and its effects as a "powerful cell tonic, alterative, and reconstructive."

In 600 cases he reports sixty-eight per cent. of cures. Obviously, hopeless cases were not treated.

Antitoxin, Oral Administration of.

Diphtheria and tetanus antitoxin, when given orally, is absorbed in sufficient quantities to show marked antitoxic properties in the blood. McClintock and King (*Journal of Infectious Diseases*, October 30, 1906).

SOCIETY MEETINGS.**THE REGULAR MONTHLY MEETING OF NEW ENGLAND ELECTRO-THERAPEUTIC ASSOCIATION.**

Boston, April 12, 1907.

*Discussion Following Letter Read from Dr. Edward C. Titus.
Topic—Gonorrheal Rheumatism.*

Dr. McFee, of Haverhill: I have treated five cases of prostatic trouble in my experience, all of which have terminated successfully. The method used was somewhat similar to that employed by Dr. Titus, except that I used a metal electrode such as was used by Dr. Snow in his work. I had one case in particular which was very interesting. It was that of a young man who had been troubled a great deal with the prostate, which kept him awake at night. He was very much discouraged when he started in with the treatment and very skeptical as to the result, but after the first two or three treatments he began to experience a great deal of relief and rested better at night. I treated him every third day, and at the end of a month's treatment he said he did not have any more of the trouble. All the symptoms were relieved, and he was apparently cured. In the beginning I found there was so much tenderness that I could only use a spark-gap of about two inches. After three or four treatments I was able to increase it to about eight inches, and he complained of no discomfort from it. I have treated four other cases with practically the same result.

Dr. Davis, of Boston: I have not had very many of these cases, but those which have come to me I have treated both by galvanism and high frequency, and have met with very good success. I do not know that I have had any which I have attributed to gonorrheal affection.

Dr. Pitcher, of Haverhill, stated that he had used both the negative and positive poles.

Ques. Have you noticed any difference in the sensation of pain in using the positive or negative pole?

Ans. You get a more sedative effect from the positive.

Dr. Pitcher: I had an interesting case of gonorrheal rheumatism in a young man twenty-six years of age. He had been under treatment with medicine and drugs for some time, and had been confined to his bed for about three weeks. When he came to me he was suffering from vesical irritation which was almost constant. He was obliged to get up at night anywhere from six to eight times for the passage of urine. He was very much emaciated and broken down generally. I found the prostate very tender and somewhat enlarged. The vesicles were very full and very sensitive indeed. At the slightest touch he

cringed and made a great deal of complaint. I started in with the static machine, wave current, positive pole, not more than one-half inch spark-gap. He suffered no discomfort from it. I gradually increased the gap to one inch, treating him every other day. From the first treatment he received benefit and was much pleased. He came to me for about one month, having four treatments the first week. He was not obliged to get up at night at all, urine was passed with very little discomfort, and he felt relieved generally. I gradually increased the spark-gap up to two inches; treated him ten minutes at the first treatment, increasing to fifteen minutes at the fourth. Since then he has had three treatments a week. Now he takes the current with about a three-inch spark-gap for from fifteen to twenty minutes with no discomfort at all. There is no particular discomfort from pressing on the seminal vesicles. The size is very much diminished so that they seem practically normal. The prostate gland is nearly normal with but little tenderness. He has had no medicine whatever, but plenty of water and a diet that is nourishing. He is back at his work as a shoe cutter and stays all day. Last week he had a severe cold which set up no irritation whatever. Usually a cold would cause a great deal of irritation to the bladder. The gonorrhea took place three years previous to the time I saw him. He had a slight stricture about midway of the canal which admitted a 14, American scale, catheter sound, but gave him no particular trouble, although on using a larger sound he had quite a little hemorrhage.

I have had several cases of this character, and I think the greatest success I have had in prostatic troubles is with middle-aged men, and with them I usually begin the treatment, if there is very much tenderness, with the insulated vacuum tube. I use a vacuum tube with a solid rubber stem to within about one inch of the end, so that they get the full effect of the current with about an inch of the tube. With this you get the current just where you want it.

Dr. Thompson: The treatments as advised by the last two speakers are radically different in two points. One uses as much current as the patient can possibly bear and the other tries to keep it down as low as possible.

Dr. Pitcher: We have been talking of two very different troubles. Of course you have to be very careful not to excite an undue amount of pain or inflammation. With inflammation, or rather hypertrophy of the prostate gland, I think you can get very much better results with the solid electrode, gradually lengthening the spark to reduce the congestion.

Dr. Wheatland, of Newport: This subject is a very large one, and very interesting to me. The large number of cases which come to the general practitioner are not gonorrheal rheumatism, but the result of gonorrheal inflammation. I have tried to treat it along the regular lines. I am very glad to hear what the gen-

tllemen here are doing. Patients who come to us with these symptoms seem to be willing to undertake anything to be restored to their usual vigor, but I have had very little to offer them, and for that reason I am here to-night, to hear what use may be made of electricity in such cases.

Dr. Morse, of Boston: I think Dr. Wheatland has expressed the feelings of us all. The usual treatment we have been employing has been unsatisfactory. Surgical treatment has availed but little, and if the ideas formulated by Dr. Titus and our recent literature offer a means of elimination by high frequency as coming from the static machine, they offer an inducement to kill the gonococci. Dr. Gray is a man who knows absolutely nothing about electricity, principally because he looks at everything from a surgical standpoint, but we would like to hear what he has to say on this subject.

Dr. Gray, of Boston: I expected to escape. With all of you I have run up against these disagreeable cases ever since I have been in practice. It seems to me that there is a certain amount of reason in what has been developed to-night. In a case of gonorrhea which runs a normal course the tissues set up a breastwork of defense. The result is a violent inflammation, the tissues acting against it. The process goes on frequently to a cure by reason of the cells being able to get the best of it. If in the course of disease damage occurs to the cells in the deep urethra and ducts at the outlet of the seminal vesicles, you have a very good culture. In determining the treatment it seems to me that it must either be a procedure which favors the destruction of the débris, or it must increase the vigor or vitality of the soldiers that form the rear-guard, so to speak. Various procedures have been invented for urethral treatment which tend to put these parts into a condition favorable to destroying the products of the disease, to relieve the engorged seminal vesicles of the accumulated débris. In cases where this does not avail, surgeons have opened the perineum and gotten rid of the diseased tissues in that way, and effected a cure. If by these high-frequency currents the tissues can be so vitalized that fresh cells are brought through in greater numbers, that is a great step in advance. If in addition to that the current can be such as to produce a contraction of the lymphatics in that locality, thus freeing the organs from accumulated fluid, that seems to me to be a better plan, and certainly offers much less risk than surgical treatment, and if the treatments which have been advocated here to-night are available I shall certainly turn over what cases happen to drift into my office to those who can give this sort of treatment.

Dr. Morse: We have just heard from a man who looks on all sides of it, which is the broad way to do. Let us hear from others.

Dr. Davis: I would like to ask these gentlemen who have

spoken on this subject if they can give a little more light. It seems to me, as I have been listening, that this treatment constitutes a form of massage given electrically instead of manually. We know that a large number of these cases of seminal vesiculitis can be relieved by massage. It is disagreeable but it can be done. The accumulated debris is carried off and gives nature a chance to reassert herself. My experience has been that manual massage has been the best, although the most disagreeable, and as I listen to the remarks of the men here it seems to me that this is all that is being accomplished. I cannot see how the result is brought about in any other way. Gonorrhea is a filthy disease, and, I believe, if treated properly in the first place, there is no need of it. I saw a case not longer ago than last night which came to the office of a friend of mine. The man had been suffering considerably and went to some druggist and got some of their compounds, and the disease, as he supposed, was checked, but very soon afterward he began to have a great deal of pain in the urethral region, anterior to the triangular ligament. I found on examination that there was inflammation of Cowper's Glands, and an inflamed condition generally. I believe that some form of massage would relieve him. I advised him to use an ice-bag on the inflamed portions at night and apply antiphlogistine during the day.

Dr. Pitcher: I think Dr. Davis is right when he says that the patient should be treated right in the beginning. If the patients would treat themselves right it would be a great help, but they will not. They don't let themselves get well. I think, however, that Dr. Davis is a little in error when he says that massage will help in all cases. About a year ago a young man came to me, sent by a friend whom I had treated. He had been massaged and stretched to the utmost, and still he retained his old trouble of vesiculitis, the massage has not helped him very much. It simply seemed to relieve, as it does in all these cases. I commenced somewhat as I have described before, and he went on to perfect recovery, although he had had this trouble between five and six years.

Dr. Anthoine: I had a case of a young man about twenty-seven or twenty-eight years of age, married, who claimed he was injured by riding a bicycle. He gave no history of gonorrhea, but the trouble seemed to be along that line. I treated this as I had other cases, with the direct current, commencing with about 3 ma. or 4 ma., continuing the treatment for three or four or possibly five minutes, keeping the electrode in one spot all the time. His trouble seemed to be near the prostate, and the neck of the bladder seemed also to be irritated. There was a constant desire to urinate. I treated him at first three times a week, then twice a week for two weeks. The last time he was in my office he said he thought he was cured, but would take one more treatment. I have not heard from him

since, and I presume he is well, or I should have heard from him. I have treated two or three other cases similar to this, with the same result.

Dr. Wheatland: I am reminded of an electrode which was presented to the American Electro-Therapeutic Association at Buffalo. It was a syringe electrode with the end covered with cotton. The fluid is carried to the end with a separate part for the current. When the electrode has reached the desired point the fluid is forced up by a syringe.

Dr. Gray: Every man for the tools he is used to. I want to say a word in regard to the electrode which has just been mentioned. It is a good thing, especially in the line of intra-uterine troubles, but I think a word of caution should be given to anyone who is going to try it for the first time. If a person has not thought about it he does not realize how much force he uses in pushing down the piston of the syringe. I had two cases of shock and collapse from attempting to do that sort of thing which I should not care to repeat. It is for that reason that I speak of this. The use of this electrode in the male urethra would probably not produce such symptoms, but in a case of endometritis great care must be given to the amount of fluid used. There is no way to tell actually the amount of fluid the uterus will hold. I think it would also be wise to experiment a little with it, and see just how much pressure it takes to saturate the cotton. I should do this if I were going to use it for the first time.

Dr. Reeves, of Boston: One might have a check on the syringe of 5 ma., or 2 ma., or any number you wish.

Dr. White, of Boston: I got this word only this afternoon, and so have not much of a paper. I was asked to speak a little on high frequency. I have not used the static machine so much in giving high frequency, as with the various coils. I understand from experts that the so-called high-frequency machine is not a strictly high-frequency machine. Just what the difference is I cannot exactly explain. My work with high frequency has been perhaps more especially in cases of nervous diseases than in prostatitis and the other cases spoken of here to-night. I lately had a discussion with a prominent New York doctor who had sent me some literature. He took exception to a letter I wrote to a physician who had written an article telling about giving from a static machine some 250 ma. The doctor did not like my calling attention to the amount of current. You can't get more out of a machine than you can put into it. Most vacuum tubes run from 50 to 55 or possibly 60 ma. My treatment has been largely in cases of insomnia, nervous debility, and sciatic neuritis. I used to treat sciatica with the static machine, using a heavy spark and giving all the machine would carry. It was pretty hot work for the patient. Instead of that I have lately been using the vacuum tube and giving it through

the trousers. It is pretty hot, but not quite so bad as that from the static machine. So far I have had good results.

Insomnia I have treated through the cervical region, running down the spine, giving a good deal of treatment to the spine. The other cases I mentioned would, of course, come in under the various paralyses.

Dr. Morse: In using high frequency do you, as a rule, use it through the clothing or on the flesh? For instance, in a case of sciatica?

Ans.: I get down to as thin clothing as I can, the thinner the better.

Dr. McFee: Is there any particular advantage in using the spark through the clothing?

Ans.: I prefer treating near the skin.

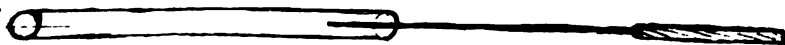
Dr. Davis: I have been much interested in what Dr. White has said on this subject. I am using this method with a great deal of satisfaction. The more I use it the better I like it, and I am thoroughly convinced that the field of high frequency has hardly yet been touched. It reaches such a large range of diseases that it is easier to mention those it does not reach than those it does.

NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

A NEW STATIC CURRENT CONTROLLER.

The importance of regulating the current from the larger static machines which are coming rapidly into general use has created a demand for a means of controlling the output, thereby adjusting them to a wider range of therapeutic application. The device shown here is a simple resistance rheostat with



adjustable screw, to be placed by an attachment in the circuit between the grounded side of the static machine and the earth. The solution has been adapted to the scale whereby the measurement of correct strength is indicated, not in milliamperes or volts, but in the relative capacity of machines having different numbers of revolving plates. By this means the effects of an eight-plate, twelve-plate, sixteen- or twenty-plate machine may be employed according to the indication, when the largest type of machine is employed. The device is not patented, and may be procured by Van Houten & Ten Broeck Co., 300 Fourth Avenue, New York.

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A RÉSUMÉ OF METHODS OF MEASURING X-RAY DOSAGE.*

BY MIHRAN K. KASSABIAN, M. D.,

Director of the Roentgen Ray Laboratory of Philadelphia, General Hospital.

Mr. President and Members:—One of the disadvantages in the use of the Röntgen rays in therapeutics lies in the want of a practical and accurate unit of dosage. Manifold have been the labors put forth for obtaining such a standard, but thus far, these labors have been unavailing; principally because idiosyncrasy plays so largely the rôle, and the difficulty in asserting what number of irradiations any special case may demand—the personal equation being a very large and determining factor.

The methods in vogue all depend on either thermal, chemical, physical, or electrical changes induced in a special reagent employed; they are therefore mechanical indices for a study of the intensity of the rays, and while practical, they afford no insight into the amount of biological action occurring in the tissues.

The following are the methods that have won most approval:

A. THE MEASUREMENT OF THE ELECTRIC CURRENTS.

1. *The Current Going to the Primary Coil.*—The voltage and amperage of a current that goes to a coil depends upon the varieties of the interrupters and the construction of the primary coil. The secondary or induced current depends upon the variety of the current or winding of the coil, because the same coil and interrupter may give different qualities of the rays depending upon the make and the vacuum of the tube.

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Philadelphia, September 21, 1906.

2. *Milliamperage of the Secondary Induced Current.*—The milliamperemeter was first advocated by d'Arsonval who used it with a Villard tube, and proved that the production of X-rays is proportionate to the intensity of the current, and has shown photographs in support of this assertion. The milliamperemeter measures the current passing through a tube; but does not tell us how much energy is expended in the production of the rays.

The milliamperemeter measures the resistance of the tube. There are degrees of vacuum where no X-rays are produced, yet the milliamperemeter indicates a passing current. The resistance of a tube often depends upon the shape and angle of the anode (platinum), upon the surface of the cathode and upon the focal distance of the cathode. A valve tube makes the current unidirectional as is shown by the oscillograph, the latter also shows absence of constant movement in the needle, whilst the milliamperemeter shows the slight changes in the vacuum by the deflection of the needle. It should never be forgotten that the reading of the milliamperemeter is not necessarily an absolute index of the amount of X-ray production in the tube. Thus we read the milliamperage and we know that the current is passing from the secondary into the tube; but how much of the current going through the tube is expended in the production of the X-rays? So much depends upon the make, shape, size, etc., of the tube and upon the relation existing between the cathode and anode that the answer is difficult, if not impossible. However Wertheim Salomonson * described and exhibited a new instrument for measuring the energy of a variable current of high potential. The milliamperemeter usually used for measuring the current in the secondary circuit indicates the mean current, whereas what we really require is the *mean square* value, and with an oscillating current these two values are not proportional.

The dilatometer devised by Professor Salomonson measures the energy expended in the secondary circuit directly. It consists of a paraffin oil thermometer, which is heated by the current passing through a slate resistance. Slate has a high and fairly constant electric resistance. The heating effect of even a small current is therefore readily appreciable. The heat is communicated to the surrounding paraffin, and the consequent ex-

* Archives of the Röntgen Ray, April, 1906.

pansion in the paraffin is shown in a capillary tube attached to the vessel. The rise of the meniscus in this tube will therefore be a measure of the total energy expanded in the circuit during the time the current has passed through the resistance. The dilatometer sums up the values of the energy for each instant since the current was started; its readings will therefore be proportional to the mean square of the current, and the rise of the meniscus per unit time will give the mean square intensity of the current. The dilatometers are standardized by means of an electro-dynamometer and a stop-watch, a small steady current being passed through the two instruments.

Experiments with these instruments showed that the efficiency of a Ruhmkorff coil is the same for all intensities of current in the primary, *provided that the resistance in the secondary circuit remains unaltered.*

3. *Spintermeter.*—The length of the spark-gap (parallel) on the secondary coil or induced current was the earliest method employed. The length indicates the internal resistance of a tube to the passage of the current; the longer the spark-gap the higher will be the vacuum. But it is a fact that the variation in the supply of current in the primary coil or interrupter will change the length of the spark-gap, with the same tube in circuit. The pointed rods of the electrodes, the composition of the rods, the atmospheric conditions, such as moisture, etc., the construction of the coil, interrupter, etc., the source of current, and also the amount of the current, will alter the length of the spark-gap. Two different tubes with the same current and same spark-gap may give different degrees of radiation because the size of the electrodes may be different and different metal may be used, etc. Bécclère, of Paris, employed a graduated rod capable of sliding to and fro. On this scaled bar he observes the number of inches or centimeters. This is a convenient form of measurement and every coil is thus supplied and is universally employed. This method is often misleading, as I have seen a tube with 3 or 4 inches (7.5 or 10 cm.) of spark-gap where the rays were far less penetrating and in some instances cathodic rays were produced.

The data given by the spintermeter hold good only for the special apparatus that the operator employs and not necessarily for other forms of this apparatus.

B. THE PENETRATION METHOD.

By this means we measure the rays directly outside of the tube, and their penetrative property or quality.

1. *The Radiochrometer of Benoist.*—M. L. Benoist * devised this instrument which is based on the principle that different metals possess different degrees of transparency as regards their penetration by the X-rays. A silver disk in the center of this device, having a thickness of 0.11 millimeter, is used as standard. Around this disk are placed layers of aluminium beginning with one layer and up to 12 layers, like the dial of a clock. These 12 sectors are designated by lead numbers, so that one can recognize them by their position without seeing the number. This apparatus can either be used with the fluoroscope or on a photographic plate. One of the sectors will match the tint of the central disk. A lead diaphragm is provided for bringing one sector into view and the diaphragm is then rotated until the tint of the sector corresponds to the tint of the center. M. Benoist † improved upon this apparatus. His device resembles a telescopic arrangement, whereby the numbers and the tints on the screen are enlarged; it is also furnished with a glass to protect the operator while testing the rays. By rotating the lead diaphragm one can examine each sector successively. Dr. Geo. Pfahler places a mirror at an angle of 45 degrees, utilizing the principles of the reflecting fluoroscope, thus preventing the rays being directly projected upon the face or hand, and in this way minimizing the danger of burns. Dr. Lacaille § has devised an apparatus which is simply a Benoist radiochrometer associated with a lunette, of similar disposition to that used by Brandt in his posometer. Such a lunette is formed of two parts: a box 6 x 8 x 10 centimeters and an eye-piece placed close to it at an angle of 45°. The box in his apparatus presents two interesting points; (1), on the bottom and placed at an angle of 45° is a mirror in which, when looking through the tube, one can see the inferior surface of the upper wall of the box; on said inferior surface is affixed a pasteboard disc covered with barium platino-

* Archives d'Électricité Médicale, April, 1906.

† Archives d'Électricité Médicale, April, 1906.

‡ Archives of Physiological Therapy, June, 1906.

§ Bulletin Officiel de la Société Française d'Électro-Thérapie et de Radiologie, July and August, 1905.

cyanide; (2), on the superior surface of the same upper wall, exactly above the platino-cyanide disc, is the radiochrometer, the shade of which is projected by the X-rays on the little screen, and reflected in the mirror. With such a disposition the operator is not directly exposed to X-rays.

All radiochrometers give only penetration power but we know that there is a great difference between the penetration and fluorescence and also between photographic (chemical) and physiologic (therapeutic) effects.

2. *Skiameters or Penetrometer of Walter.*—Many different metals have been used to determine the penetrative power of the rays, but as with Benoist's device this apparatus does not indicate the intensity of the rays. Two different tubes which have the same penetrative power, may differ in their chemical and physiological effects.

3. *Crypto-Radiometer of Wehnelt.*—This apparatus consists of a fluoroscope with a sliding or telescopic arrangement and provided with a sheet of lead to protect the hand of the operator and a single "V"-shaped piece of metal which gradually increases in thickness. It is claimed by Wehnelt that his apparatus is more accurate and allows a wide range of comparison on account of the wedge-shaped character of the piece of aluminium.

C. THE PHYSICO-CHEMICAL METHOD.

Because of its accuracy and precision, I believe that physico-chemical measurement more nearly approaches the ideal than the other procedures in vogue. This method has been ably illustrated by Holzknacht. He based his theories and constructed his apparatus upon the principle that certain salts suffer a change of color when exposed to the cathode rays. Other substances when heated and irradiated, undergo a change of color as the chloride of lithium, which becomes a greenish yellow, and carbonate of potassium, which changes to a heliotrope. On exposure to the air or at a high temperature the colors of these salts are seen to disappear. He also proved that X-rays and Becquerel rays possess this property, and they are all transformed into ultra-violet rays at the point of impact with the surface.

1. *Chromoradiometer of Holzknacht.*—Guido Holzknacht, of Vienna, presented this device for the consideration of the pro-

fession in 1902. Holz knecht's studies on this subject led him to fuse certain salts and to expose them to the action of the rays. He employs a small capsule containing the reagent covered with celluloid. This reagent, which is colorless and whose composition has heretofore been kept a secret, has been analyzed by a French chemist, M. Lind, and M. Bordier describes it as follows: "99.77 per cent. consists of potassium sulphate, the remainder being potassium sulphite or hyposulphite, or possibly potassium tri-tetra- or penta-thionate. The mixed mass is impregnated and held together with copal varnish. This capsule (which is placed over the cutaneous area to be treated) has a dirty-yellow color due to the copal varnish and under the influence of the X-rays the color changes to a greenish tint, gradually becoming deeper as the quantity of the rays is increased. After or often during the irradiation this capsule is brought near to a standardized scale which is graduated in Holz knecht units, from 1 H. to 24 H., the color scale being graduated from a greenish yellow to a deep green, which serves as a standard of comparison for judging the color of the capsule after irradiation. The unit is indicated by H. The treatment is interrupted in order to compare the color of a reagent with that of the scale, and this is repeated until a tint is obtained which corresponds to the precise dose required. As more than one sitting may often be necessary, in the interval between the two exposures this reagent must be kept in darkness. This graduated scale holding the numbered capsule is kept in a light-proof box. Although this method would seem very correct in theory, yet in practice we meet with many difficulties. The standard scale suffers changes in color or it may fade in the course of a year. Subsequent to exposure the capsule gets darker and must be compared immediately. The comparison of the capsule with the scale is very difficult. Different individuals and different parts of the body exhibit different degrees of susceptibility, and the various diseases display individual peculiarities to the action of the rays.

2. *The Radiometer of Sabouraud and Noiré.*—In 1904 Drs. Sabouraud and Noiré introduced a method largely employed in France. It consists of a small disk of paper over which is spread a layer of platino-barium cyanide; this salt assumes a brown color under the action of the X-rays. M. Villar pointed out that under the influence of increasing doses of the rays,

platino-cyanide passed from a bright green to brown, and at the same time the fluorescence gradually decreased. Upon a two-page leaflet the standard color is a pastille marked "A" (which is an unchanged green color) and another one marked "B" which is brown and indicates the maximum dose which the skin can tolerate without producing dermatitis and causing only epilation. The comparison should be done in a dimly lighted room because if the pastilles are exposed too long to the light they regain their original green color. The pastille should be placed in a pastille carrier (8 cm. from the anode) and midway between the part under treatment and the anode. The standard color pastille "B" corresponds to a dose of 10 X or 5 H in Holz knecht units. Sabouraud himself admitted that the test, however, is less sensitive than by the Holz knecht method and that the color may change by the action of heat, light, moisture, etc. It is asserted by some that the location where the pastille is placed under the active hemisphere may not be equally irradiated because the rays are unequally distributed over the active hemisphere.

3. *The Chromoradiometer of Bordier.*—Bordier * describes a new method, based on the principle that when platino-cyanide of barium is exposed to the rays it undergoes a change of color due to the dehydrating action of the X-rays, also, that the same discoloration occurs when this chemical is placed in an atmosphere artificially dried by sulphuric acid or when exposed to a gradually increasing temperature. Under the action of light rehydration may also occur. He describes his apparatus and reagent as follows: "The Bordier Chromoradiometer differs from its predecessors. The barium-platino-cyanide, suspended in a thin layer of collodion, is placed on the skin itself, or at all events in the same plane as the part to be irradiated. The pastilles are square, with a diameter of 6.5 millimeters. The back of the square is adhesive, to facilitate its attachment to the skin. A scale of colors is supplied with tints Nos. 1, 2, 3, 4, corresponding to the principal reactions required in radiotherapy. Tint No. 1, a pale yellowish-green, is the shade that the pastille takes when exposed to the maximum dose of rays compatible with the complete integrity of the normal skin. With this dose of X-rays the hair falls out some twenty days after exposure, and grows again entirely in another twenty

* Archives of the Röntgen Rays, June, 1906, p. 9.

days. This is the weak normal exposure of Kienböck corresponding to a skin reaction of the first degree, accompanied by temporary loss of hair.

"Tint No. 2, of a sulphur-yellow shade, is that the pastille assumes when the skin has been exposed to an irradiation calculated to produce a strong reaction, *viz.*: erythema, tumefaction and at the end of the reaction marked desquamation. This No. 2 tint corresponds to a mild form of Kienböck's reaction of the second degree.

"Tint No. 3, is almost of the color of gamboge. It corresponds to a reaction of the skin of the second degree; it is a true dermatitis. Latest period is eight to ten days. This is Kienböck's strong normal reaction.

"Tint No. 4, is of a chestnut color, and corresponds to a reaction of the third degree which is accompanied by necrosis and ulceration of the skin. This is the strongest dose ever required and should never be applied to the normal skin. He obtained tint No. 4 after irradiation of a specimen of radium of a radioactivity of 100,000 for a week at a distance of a millimeter from two pastilles."

The soft tubes are not desirable for these reagents as they emanate ultra violet rays which will be confused with those of the X-rays. He reports cases that were cured at a single séance. He believes in one massive dose rather than in fractional doses, so common in this country. This method is also subject to the same objections that I have mentioned before.

4. *Quantimeter of Kienböck*.—In 1905 Dr. R. Kienböck introduced this new method of direct dosimetry, and asserted that in 1900 he demonstrated that the changes noted on a photographic plate are an accurate measure of the therapeutic dose; admitting* however that Stern† published a paper on the photo-radiometry, and suggested the use of photographic films, to be compared with a "normal scale;" but at that time Kienböck was unaware of the fact. He describes his instrument as follows:‡ "My quantimeter consists essentially of two parts, a strip of photographic paper, which is easily applied to the irradiated skin, and a normal scale of graduated tints, with

* Archives of the Röntgen Ray, June, 1906, p. 17.

† Journal of Cutaneous Diseases, December, 1903.

‡ Archives of the Röntgen Ray, June, 1906, p. 17.

which it is to be compared. The paper is covered with a sensitized film of chloro-bromide of silver in gelatine. After exposure, the strip may be developed in a dark room or by means of a small light-proof box. The development can be carried on in daylight in the consulting room. The film is then compared with the standard scale, either at once or after drying. The developing solution is of constant composition, and should be used at a temperature of 18° C. or 64° F. for a period of exactly one minute. After fixation, the strip of paper may be immediately compared with the scale." The unit of Röntgen light which we call X is equivalent to one-half of a Holznecht unit and to one-tenth of the Sabouraud-Noiré maximum dose. The formula is as follows: 1. S-N maximal dose = 5 H or 10 X."

This reagent enables us to measure the penetration or the degree of hardness of the Röntgen light. In comparison with other dosimetric methods, the quantimetric method has the advantage of greater exactness and the possibility of estimating small differences of dosage. This method is a permanent registered record. The disadvantage of this method is the difficulty which is encountered in comparing and distinguishing the slight differences of tint on the scale. Careful development is necessary and always tedious. When massive doses are given the color will be darker and will be more difficult for making comparison with the scale. The degree of the sensitiveness of the emulsion of the paper may frequently differ.

5. *The New Radiometer of Freund.*—This method was used in 1904, and is based on the color changes occurring in a two per cent. solution of pure iodoform in chloroform. This solution normally retains its color unchanged for 48 hours and is so very sensitive that a difference of tint may be observed between two portions of the solution, one of which is exposed to the rays for three minutes, while the other portion is screened from the action. Slight heat and light will alter the color of the solution, but although this method is most accurate and sensitive, the solution is too unstable for practical and clinical purposes.

The iodoform (CHI_3) is decomposed by the X-rays with the liberation of free iodine, and imparting a claret color to the solution. Freund's solution shows a change of tint in six minutes equal to that attained in ten minutes by the use of Holznecht's pastilles.

6. *Precipitation Test*.—Schwartz,* of Vienna, demonstrated a method of measuring the strength of the Röntgen rays, based on the precipitation of calomel in a mixture of ammonium oxalate and corrosive sublimate. This mixture is a clear fluid which, sheltered from the light, keeps indefinitely. Exposure to daylight or to the Röntgen rays causes precipitation of calomel. The amount of precipitation is determined by centrifuging in a graduated capillary tube. Three millimeters of the precipitate in the capillary tube corresponds (approximately) to the strength of a Holzknecht unit. This technic with the usual methods of testing the strength of the latter has the disadvantage of being a subjective test of color.

D. THE IONIZATION METHOD.

Prof. Röntgen in his second announcement stated that he had already made this discovery and probably prior to this J. J. Thomson found that the X-rays would discharge both negatively and positively electrified bodies, by experiments on Hankel's electroscope or electrometer. Thomson stated that the discharge varied somewhat with the intensity of the rays by the relative luminosity of the fluorescent screen, and by the relative darkness produced upon the photographic plate in several instances. This method is based on the principle that X-rays have the power to ionize the gases through which they travel.

1. *The Ionization of Confined Gases*.—Milton Franklin † states that, "so far as I have been able to ascertain this method has not been systematically used to measure the intensity of the X-rays. This method has been commonly employed to measure the radio-activity of the radio-active substances. Air is rendered a conductor of electricity by the ionizing agent, and the measurement of the amount of current flowing through it under given conditions gives an absolute index of the activity of the radiation. It is necessary only to charge the electroscope by applying a rod of vulcanite, sealing wax, resin or other suitable material, which has been previously electrified by friction and then to time the transit of the filament under the influence of X-rays. The rate of discharge will vary directly as the activity of the radiation." The working of the instrument is as follows:

* Wiener Klin. Wochst., May 31, 1906.

† New York Medical Journal, April 22, 1905.

"The electroscope is charged by having brought into contact with the knob, a rod of vulcanite which has been electrified by friction. The knob is brought into communication with the filament, while the vulcanite is in contact, and released as soon as the filament has assumed a horizontal position. The electroscope is brought to the same distance from the tube as the plate or patient (in any position) and while the tube is running, the shutter is opened and the time in seconds, occupied by the filament in transit, is noted. The number of seconds is the exact coefficient of energy of the rays and when compared with any other reading made under any circumstances whatever, with a similar instrument, the ratio of energy of the two radiations will equal that of the two times.

"In this method with an electroscope, on the other hand, of the gold leaf pattern, the relative activities of two radiations may be compared with great accuracy and expedition, and if one of them is the standard unit of activity or bears a known ratio to the standard, the value of the other, in terms of the standard, will be readily deducible. Atmospheric variations must be taken into consideration. The number of seconds which it requires for the filament to traverse the field is the coefficient of the strength of the rays. All calculations and variations due to atmospheric absorption must be eliminated at once."

Dr. Henry G. Piffard* takes a brass ball about one and one-quarter inches in diameter and supports it about four inches from the wall of the tube just within the circle of rays issuing from the anterior hemisphere. The ball is then connected by a cord about eight feet long to the charging device of the electroscope. As soon as the current passes through the tube the aluminium needle or foil indicates the charge and the angle is easily read off on the scale. For this purpose he found Braun's electroscope, which is graduated in volts, or his own, which is graduated in degrees of an arc, very convenient. The angle varies directly with the current passing through the tube, and also shows whether the tube is running steadily or not, and indicates any notable change in the vacuum.

2. *The Radio-active Standard of Phillips.*—Phillips† utilizes

* Journal of the American Medical Association, September 15, 1906.

† Archives of the Röntgen Ray, June, 1906, p. 27.

the principle of Franklin's method of ionization and suggests radium as the standard unit. He describes the *modus operandi* as follows: "The method consists in attaching two similar discharge vessels one to each of the plates of the electroscope, or thin strip of silvered mica and forms a right angle to the horizontal rods, the former is electrified inductively. The horizontal rods are connected with the standard radium, when the rods are equally charged the needle is steady but gives no deflection."

Phillips further says: "We may also conveniently compare the activities of various substances by noting the time taken for a gold-leaf electroscope to discharge between certain potentials. To do this with anything approaching accuracy, however, the motion of the leaf must be observed with a reading telescope." He calls the absolute unit Becquerel or one Curie, while the commercial unit might be appropriately known as one "ray."

E. THE PHOTOMETRIC METHODS.

This method consists in comparing the fluorescence of a platino-barium cyanide screen with an artificial light either with a fluorescence produced by radium or a radio-active salt.

1. *The Radiometer of Courtade.*—This instrument consists of a lead shield containing two similar openings, covered by a fluorescent screen. The radium, which serves as a standard of fluorescence, is placed behind one aperture. The degree of fluorescence on the second screen produced by the X-rays is equalized with that of the standard, by altering the distance of the Crookes tube. This distance will be a measure of the amount and the quality of the radiation. This method is not thoroughly or absolutely correct because the intensity of the fluorescence of all the platino-barium cyanides is subject to great variations when exposed for a long time to the action of radium or the X-rays.

2. *The Guilleminot-Courtade Method.*—Founded on the same principle as the radiometer of Courtade, Guilleminot employs a sample of radium as his standard of comparison whose activity is 50,000. He considers the unit of quantity of the X-ray is, that quantity falling on one square centimeter of the surface in one minute of time. This unit he calls the unit "M." For example if the Crookes tube has to be placed at a distance of 3 meters, in order to produce an equal illumination of the

screen, then the intensity of irradiation of the field at 3 meters from the tube is said to be unity. From this it is easy to calculate the number of units "M" absorbed per minute at a distance of 10, 15, or 20 centimetres. Thus in the above example the number of units absorbed per minute at 10 centimeter distance is 900, "M" = 3 meters—300 cms. then $\frac{300 \text{ cm.}}{10 \text{ cm.}} = 30 \text{ cm.}$,

therefore 30 cm. x 30 cm. = 900, while it is 400 at 15 cms., etc. 11.* This is open to the many objections mentioned before, the platino-barium-cyanide changing its color of fluorescence, etc. This does not give us the amount of absorption in the tissue, but we infer that from calculations deduced.

3. *The Fluorometer of Williams.*—This instrument† depends upon the distance that a tungstate of calcium screen must be held from a given vacuum tube, in order that the illumination from it may equal that from a radio-active substance which has been measured by a standard source of light. "I found," says Williams, "that when a tungstate of calcium screen with the radium (Curie) lying upon it was placed over a vacuum tube in a dark room and the X-rays allowed to strike it the radium was less bright than the luminous screen; but that as the screen was moved farther away from the vacuum tube the brightness of the screen diminished until a point was reached at which the screen was less bright than the radium, and that then by gradually approaching the screen nearer the vacuum tube a point was found at which the radium and screen were about equally bright.

"I experimented with several tubes in this way and found that the distance at which the screen and the radium were about equally bright was different with different tubes, the limit of variation being between 10 and 41 centimeters; and the distance was constant for the same tube under the same conditions. As by means of a photometer the amount of light given off by the radium can be measured in terms of a known standard, so the amount of fluorescence produced on a tungstate of calcium screen by a given tube the brightness of which a given screen is capable, may both eventually be referred to the same standard. The fluorometer may serve as a basis, with a given apparatus, for determining the length of exposure when X-rays are used

* Archives of the Röntgen Ray, June, 1906.

† The Röntgen Rays in Medicine and Surgery, 1903, p. 640.

as a therapeutic agent, and likewise when they are employed for taking radiographs."

This instrument has the objection that the durability of tungstate of calcium varies with different tubes and also the vacuum of the tube changes during exposure and requires constant attention.

4. *The Method of Contremoulins*.—With this method, instead of employing radium, the standard fluorescent screen is illuminated by an acetylene light. This is open to the same objection as stated above.

5. *Selenium Photometer*.—Ruhmer Levy presented at the Berlin Congress in 1905 a new instrument for measuring the X-rays. A selenium cell is clamped in position at a fixed distance from the anode, a current from a couple of dry cells is passed through the selenium and its intensity is read off on a milliamperemeter. The X-rays alter the resistance of the selenium, and the variation of the current is therefore a measure of the quantity of the rays.

Dunham's instrument* consists of a selenium cell, which is placed inside of a wooden pill-box and surrounded by tungstate of calcium. This and a volt meter are placed in series in a direct current of not less than 60 volts. When this is placed before an X-ray tube the tungstate of calcium is caused to fluoresce and the light derived from the fluorescence causes the resistance of the selenium cell to be reduced. The fluorescence is much less powerful than a 15-candle power lamp. This lowering of resistance in the cell allows the current to flow more readily, and this can be directly measured by a very sensitive volt meter. The next instrument depends for its action on the fact that a 2-per cent. solution of iodoform in chloroform is very easily and uniformly affected by the X-rays. Its appearance when so treated varies from a light pink to a very dark reddish brown. The second instrument is as follows: The selenium cell and volt meter are put in series as before, but no fluorescent salt is used. The wooden box is removed and the cell placed in a light, tight box. The resistance of the selenium cell is reduced by the electric lamp beyond a partition. The light must pass from a lamp to the cell through the bottle because of the small aperture. To make this doubly certain the opening is fitted with a small cylinder so that the rays must

* Lancet-Clinic, Cincinnati, August 25, 1906.

pass as desired. When it is desired to measure a given dosage all that is necessary to do is to fill the bottle, place it in the box, and make the reading. The solution is clear and practically all the light passes to the cell. The resistance drops and the voltage as read on the meter goes up. The bottle is now removed, laid on the surface of the patient near the part to receive the irradiation. After the treatment it is quickly placed in the box and the reading taken. The quantity of X-rays will be read by the difference of the voltage before and after the exposure.

Dr. George C. Johnston* takes advantage of the fluorescence produced on the tungstate of calcium or other screen as indicating the quantity of the X-rays emitted. The fluorescing screen is placed in a light, tight box, and facing it is a selenium cell. Such a cell, when kept in total darkness, may have the resistance of several hundred ohms, yet on permitting light to strike on the cell resistance falls almost instantly, and this alternation bears a direct relation to the intensity of the light. If there is placed in series with such a cell a galvanometer or ammeter of sufficient delicacy, a series of current such as an ordinary dry battery and a variable rheostat providing a means of introducing more or less ohmic resistance into the circuit, and the rheostat, the measuring instrument, and the selenium cell be balanced, the point will be found at which the ohmic resistance of the rheostat, the communicating wires, the selenium cell, and the measuring instrument will exactly balance the electro-motive force of the battery.

If, however, the container having within it the screen and cell be placed in the path of the X-rays, the screen will become luminous in proportion to the distance from the source of the rays, and the quality of rays striking it. The container will be illuminated, the selenium cell under the influence of this light will change its ohmic resistance in proportion to the light, and the current flow will be measured and indicated on the dial of the galvanometer.

6. Fluorescence of the Tube and the Appearance of the Electrodes.—This method does not afford a reliable means of determining the penetrability of the rays, as the fluorescence depends upon the kind of glass composing the tube. In a dark room this fluorescence will be more clearly discernible. Behind the anode there may often be noticed annular patches of fluorescence, indicative of a high vacuum. In studying the appearance of the electrodes, a phenomenon sometimes noticed is the emission of a fine smoky stream around the edge of the cathode; indicating a high degree of vacuum. A low vacuum in the tube can be recognized by a conical stream of cathode rays of a blue color. The appearance of a cherry red heat at the anode indicates that the tube is working properly, and that rays of a high

* Journal of the American Medical Association, September 15, 1906.

degree of penetrability are being produced. However, this will vary according to the thickness of the platinum anode and the strength of the current. It should not be forgotten that the same tube will fluoresce differently with the different amounts of current, which will produce more or less penetrating rays.

7. *The Thermometric Method.*—Köhler places a thermometer into a depression in the Crookes tube, whereby he gauges the variation of temperature as indicative of the quality and quantity of the rays.

In conclusion, I earnestly urge this society to appoint a committee to co-operate with other investigators along this line, hoping to decide upon a reliable and accurate method of estimating dosage.

Discussion.

Dr. A. C. Geyser, New York City: I wish that I could influence each and every member of this Association to bring papers of this technical value before the meeting. After all, it takes us but a short time to tell what we know. Dr. Kassabian has simply told us what he does not know, and that paper is in my opinion one of the most valuable that has come before the Association. I agree fully with Dr. Kassabian when he says that personal equation only for the present is going to be the meter in a particular case of radiotherapy; yet let us hope that in the near future some means will become known whereby we are enabled with uniform apparatus to measure the output in a more scientific manner than at present.

Dr. Morris Weil Brinkmann, New York City: I agree with Dr. Geyser regarding the value of this paper. Dr. Kassabian is striving for something definite and absolute, and he is upon the right path. He says we have not got that in x-ray work for which we are all striving. I agree that if we ever do get a standard of the effect and quantitative activity of the ray it will be by some method where the ray will be concerned with the tube, because the tube electrically is simply a transmitter and the variety of things that occur in its transmission is astonishing to us. I do not know that I have heard a paper with which I so heartily agree, at any time, nor a paper in which I so admired the spirit which is an earnest search for truth.

Dr. Henry E. Waite, New York City: We are making experiments all the time and while we may measure the amount of current that passes through the x-ray tube, it has no bearing upon any other tube, but will act as a guide for that particular tube only. We are experimenting that we may have some standard that will be of use to any tube. All coils of different makes give different results and that of itself makes it impossible to arrive at a uniform result until we standardize our coils; so that no matter from which reliable manufacturer you may purchase a coil, we cannot obtain the knowledge that will give us uniform results.

SYMPOSIUM ON X-RAY BURNS.*

Dr. Sinclair Tousey: The x-ray burn is due to the portion of the rays which are absorbed by the most superficial layers of the skin and follow the soft rays given off from a tube having a low degree of vacuum. It seems impossible to get a tube giving exactly one rate of vibration. It is, however, practicable to interpose some object between the x-ray tube which will absorb, the soft rays as in the case of the leather used by Dr. Newcomet. This will save the patient from being burned and permit more of the penetrating rays to be applied. I used to use a piece of tin foil, and we used to hear about smearing the surface of the patient's body with vaseline as a means to the same end.

The burns are, of course, of different degrees. In the treatment of hypertrichosis it is often desirable to produce a mild x-ray burn showing redness, soreness followed by desquamation after which the skin is soft and white as a baby's. The accidental burn, which ought never to happen, is apt to be severe and may cause necrosis of the skin. It is exceedingly painful. These burns are supposed to be due to a change in the arteries and not at all to heat, the sensation of the patient being no guide whatever to the danger. A certain form of burn sometimes makes its appearance a few hours after an exposure to the x-ray and is due to ultra violet rays emitted by the x-ray tube. It is of the same nature as a sunburn, the latter being probably due to ultra violet rays. It may be followed by the appearance of an x-ray burn but this has a period of incubation of seven to fourteen days, depending upon the severity of the application.

Dr. A. C. Geyser, New York City: In talking about x-ray burns I do not think we ought to begin with the burns, but with the tube itself and especially the field around the tube which I believe to be the cause of the burn. By removing the cause we will do away with the burn. You have noticed that for the past three or four years about every three or four months, a new device has been discovered to prevent the burning of the skin. One of the earlier methods was to have a metallic plate connected with the ground and that gave apparently good

* Discussion at the afternoon session of the American Electro-Therapeutic Association at Philadelphia, September 20, 1906.

satisfaction for a long time. Why it was discarded I do not know. Shortly after that leather was used, then glass was used, then the surface of the body was used by placing upon it various so-called protecting agencies, such as vaseline and other substances; all warranted as preventatives, but it was soon proven that they were not preventatives. Two and one-half years ago I began on an entirely different system, a new theory. It was my opinion that the burn was produced by the inductive influence which the current causes in the air between the patient and the tube. This can be overcome by placing the tube in direct contact with the lesion to be treated. I have for a long time drawn a sharp and clear line between constitutional and local treatment. When I desire to treat locally, I apply the tube directly to the surface, absolutely in contact to prevent the induction which takes place between the outer surface of the tube and the skin. It is thus absolutely impossible to burn a patient. I have gone so far as to allow a tube to remain in contact for 25 minutes with a normal area of skin. The skin came off in a blister but there was no burn, at least no inflammation. The moment you do away with the induction between the tube and the skin you get rid of the burn. For this reason it is apparent that the high penetration does not burn, because the patient is removed from the field of induction. With a tube of high penetration you can keep the skin surface away from the tube and produce marked constitutional effects; while with a tube of low penetration the tube is brought so near to the body that you have the induction in the dielectric and the burn results. Any manner of means that will conduct the induction away by making direct contact to the body of the patient will prevent the burning.

Dr. Thomas W. Brockbank, Phila.: Dr. Geyser has given a clear idea of the cause of burns and my opinion is exactly in accordance with his and I am glad to know that such an eminent man has confirmed my opinion that has not been expressed except privately. There is a phenomenon difficult to understand going on in the area between the external surface of the tube and the surface of the patient's body.

Dr. George Z. Goodell, Salem: Dr. Geyser's statement explains a case seen some time ago.

My uncle, seventy-two years of age, had a scaly eczema on his right elbow, duration of which was forty years.

I treated it with a medium tube, giving fifteen minute treatments. Liking the feeling of the short sparks from the tube, he had his arm against it a great part of the time. I looked for signs of a burn, but he had none. Ever since, his arm has been as smooth as a baby's.

Dr. Henry W. Frauenthal: One point in connection with burns is the idiosyncrasy of the patient. This is sometimes apparent in making a single short exposure which may produce a burn. Short exposures at shorter or longer intervals gives an accumulative effects as do some drugs. I think we can get the same kind of exfoliation as has been mentioned from the x-ray by giving a number of short exposures.

Dr. H. E. Waite: In the early days of using x-ray tubes, we found that by placing our hands on the back of the tube, we could get a glow; otherwise there would be none. I have done this many times without any injury to my hand with the exception of a little heat. Once when holding my hand there for twenty minutes, the skin peeled off the same as would come from a blister, but there was no serum or destruction of tissue. It seems to me from this experiment that Dr. Geyser is correct in his statement.

Dr. Henry W. Frauenthal: There are two types of burns interesting to us as practitioners. One may be called the accumulative burn received by the man who is using the x-rays. I think the cases in which we burn by a single exposure might be explained in that way. In cases of endarteritis there is particular susceptibility to x-ray burn. Some men have used the white light to counteract the tendency to burn in their own work and I think it has the desired effect.

Dr. Morris Weil Brinkmann: In requesting that this subject be taken up I have viewed it not so much from the manner in which the burn was accomplished, that is, the peculiar qualities of the tube, or the dielectric that surrounds the tube or the quality of the energizing ray, as from the standpoint of the patient and the result that we are all familiar with. As the last speaker indicated, we must realize that there are two groups of burns, the acute process, and the other type in which we have the scaly ulceration. This is most common on the back of the hand owing to the peculiar manner in which it is unconsciously held in the use of the fluoroscope. I have inquired of different men their ideas concerning treatment. Some

have thought that fatty inunctions were of value. All thought the white light did good.

In the acute cases I have had some cases which I burned intentionally. I do not think you influence some conditions unless you do burn. In those cases I use a cold compress for a day or two persistently applied. In the chronic cases with this condition of endarteritis, semi-desiccation and lack of vitality we can do much by securing a good blood supply to the parts involved. Any procedure, however, must be continued for a considerable length of time because of the nutritive change in the vessels of the part. Every man should devote time and attention to the acquisition of means of proper defence. The application nightly of a dressing consisting first of a thorough inunction of lanolin, and the application of the water wet linen compress covered by heavy flannel, closely fastened, produces excellent results, invariably softens the epidermis, relieves tension in the corium, enhances metabolism and favors the absorption of the exudates, and arrests stasis and new exudate formation. The dressing is to be worn during the whole night, and must remain slightly moist until morning, no glycerin is used. The oxides of lead are impervious to the ray, and a wedge-shaped casting of plaster of paris having a certain amount of lead oxide will effectually intercept the ray in proportion to its contained proportion at any particular point. We can thus form a basis for a lead oxide paint with protective qualities.

Dr. Henry W. Frauenthal: A method which has been of value is that of soaking the hand in water as hot as it can be borne, cover it well with lanoline and sweat it with a rubber glove. Internal medication is given with the idea of dilating the capillaries.

Dr. William Benham Snow: If the patient is exposed to light, perhaps twice the length of the time of exposure to x-ray, there is a counteracting effect. We have always recognized radiant light and heat to be a stimulant while it is established that x-rays inhibit function. The burn produced by light is from over-stimulation, while that of the x-ray is due to lessened resistance—approaching death of tissue. In the use of light we have then an opposing agent which has been well established clinically. It did not occur to me in my early work that they were to such extent antitheses and I for several months fol-

lowed the x-ray with light exposures, when finding that my patients ceased to improve as formerly it was discontinued. The effect of the light offsets effectually the tendency to dermatitis and my present method, when raying a deep-seated tissue to which I am quite confident the light will not penetrate, is to apply the light to the skin when employing the x-ray to affect the deeper structures.

For these reasons we turn rationally to light in the treatment of x-ray burns, and with satisfactory results as good I believe from the incandescent lamp as from the electric arc.

Dr. F. Barrett, Westbrook, Me: I have carried out the plan of alternating the light with the x-ray to prevent x-ray burns. I do not know whether it is the heat and the congestion produced from the heat or whether it is a chemical effect of the light rays from the upper end of the spectrum, that prevents the x-ray burn.

Dr. M. K. Kassabian: When we began the use of the x-ray we did not know what it was going to do. Therefore, I used to expose my hands in order to test its intensity. There was a slight dermatitis but I did not mind it much. I was very enthusiastic over the work, and had no warning of the danger. The itching which is the first sensation seems to indicate that the nerves are the first tissues involved. We know that the same spot on the same finger is always affected, which proves that the nerve endings are affected. Of course if the nerves are affected, the blood supply to the parts is disturbed and we have the general dermatitis. I would like to mention that the purpose of the x-ray is not an electrostatic action.

In a fluoroscopic examination we are able to come nearer to the tube. That is one of the reasons that we do not burn our patients, but we do burn ourselves. There are many theories about the protection from x-ray burns, and instead of talking of the cause of the burns I would like to mention a few facts concerning the protection of the patient and the operator. The only device that I personally resort to is not to remain in the room when the x-ray treatment is being applied. I go into the next room, between which and the other room there is a heavy partition in which there is about one inch of lead. In one corner of the office there is a mirror in which I can see the patient and the Crookes tube. By sitting in this room I am entirely x-ray-proof. The only trouble now with my hands is

that produced from the old burns. The tissues are becoming devitalized and a long time is required for healing. The difficulty of keeping them dressed also retards recovery.

Another method is to place the tube in a lead box but then the working of the tube cannot be seen which is necessary in taking skiagraphs. Before entering the room I turn off the current of the x-ray.

The only remedy that I find of any value now in the chronic condition of the burns is in immersing my hands in water as hot as I can bear it for ten minutes. Then I feel entirely relieved from the sensation, which nobody knows except those who have been x-rayed. After immersing them I wrap them in sterile gauze. This gives relief for a few days. When suppuration takes place I simply immerse them and put on a little lanolin. Slight pressure is applied to keep in the moisture and heat. While x-ray burns are sometimes infected I do not think they ever become malignant.

I do not think there is at the present time any danger of unconsciously burning a patient, for we can protect our patients with alum and lead, which take away the soft rays. We must first learn the idiosyncrasy of the patient.



INFANTILE PARALYSIS.*

BY SAMUEL J. BASSFORD, M. D., PORTLAND, ME.

This disease is the most important of the diseases of the spinal cord which result in paralysis. It is found usually in children, hence its name infantile.

Anterior poliomyelitis indicates the location of and the condition of inflammation of the parts involved.

These cases are of quite common occurrence, and an early diagnosis and correct treatment are of great importance.

The spinal cord is a continuation of the medulla oblongata. From it are given off the nerves which supply the muscles below the head.

The spinal nerves arise from cells in the anterior and posterior cornua of gray matter. Nerve filaments from these unite to form the nerve shafts, which pass out from the spinal cord, the anterior, which are motor, uniting with the posterior, which are sensory, to form the mixed nerve trunks. The importance of the cells found in the anterior cornua is seen when we understand that motor impulses which have their origin in the motor tract of the brain, are transmitted through the anterior gray matter of the cord to these nerve cells and carried along the processes of the cell, which becomes a nerve filament, to be conveyed by the spinal nerves to the muscles which they supply.

Injury or destruction of any part in this tract, between the brain and muscle, will result in partial or complete suspension of function.

During the course of the disease certain anatomical changes occur. The most characteristic of these is to be found in the anterior cornua which is in a condition of inflammation.

The onset of the disease presents the characteristic onset of an acute inflammatory affection.

The resulting hyperæmia causes pressure upon the nerve cells, and produces, when long continued, permanent abnormal conditions of the cord, neurons and muscles.

Unless early arrested this inflammation causes atrophy of the

* Read before the Maine Medical Association at Lewiston, Me., June 12, 1907.

nerve cells, together with atrophy and structural change in the cord itself at the seat of inflammation.

Etiology.—One author says regarding cause, that little is known of the etiology of this disease.

Among causes noticed however are age, season of year, exposure to cold, falls or injuries, and as sequel to certain diseases.

The disease is most common in the first three years of life, but it is rare before six months.

A majority of cases occur in the warmer months of the year.

Exposure to cold is undoubtedly a common cause. Dr. Hammond cites two cases, occurring in brothers in whom it was apparently induced by allowing children to lie on the damp ground for an hour or so.

The disease has been observed to follow an injury and also as a sequel to whooping cough, measles, or the other exanthemata.

In a large number of cases no cause can be discovered.

One theory of the disease is that it is due to an acute infection, located in the spinal cord just as other infectious diseases show a predilection for other parts, as in cerebro-spinal meningitis.

The microbic origin has not been demonstrated, but the symptoms and facts presented lead to the belief that the disease may be infectious. The fact that epidemics of this disease seem to occur gives weight to this theory.

Symptoms.—The symptom of greatest importance is the paralysis. This may be observed very early in the attack or it may be somewhat delayed, or it may be obscured at first by the prominence of other symptoms.

In the majority of cases the onset is sudden and we observe symptoms of general illness, as fever, vomiting, pain, with sometimes convulsions. But the disease is not always ushered in with such abruptness, and symptoms may come on gradually.

Pain is not always present at the beginning, and fever is not found at the first in all cases.

There is an absence of cerebral symptoms and sensation is not affected.

The paralysis may affect one or even all the extremities.

The first period of infantile paralysis is that in which the paralysis is noticeable without atrophy, and may last a month or even six weeks.

At this period the paralysis partially passes off and there is a return of muscular power which had been lost. Gradual restoration takes place in muscles or groups of muscles, but if not soon restored the appearance of atrophy is manifest, and often progresses very rapidly.

The atrophy of muscles and the accompanying weakness of ligaments about joints, cause the bones to separate to some extent so that we get an increased mobility of joints.

Diagnosis.—It is said that in its entirety infantile paralysis cannot be mistaken for any other affection.

While this is true when the symptoms have all presented themselves, yet in its earliest stages, until the paralysis is apparent the disease may not always be recognized, but when the paralysis accompanies the fever, pain, etc., the diagnosis is plain. So important is the matter of early diagnosis in this affection, that, when symptoms such as fever, pain, convulsions, and vomiting are present in a young child, this disease should not be forgotten, and paralysis should be suspected and searched for.

The fact that it is in the very early stages that we can give most aid to our patients renders the early diagnosis a matter of vital importance, for upon this and a vigorous treatment will depend our success in these cases.

Prognosis.—The prognosis usually is favorable as far as a fatal termination is considered.

Regarding the paralysis it is not safe to venture a prediction in the early stages.

Should the inflammation be controlled before the nerve cells are destroyed, and atrophy has resulted, a cure will be had with no permanent loss of use of limb.

Should treatment be delayed, or be unsuccessful in allaying the inflammation, permanent paralysis is likely to follow.

If the muscles have lost their electric contractility the outlook is not so good. The use of the electric current (galvanic or faradic,) for determining the presence of or loss of contractility of muscle is an aid of much value in prognosis.

Should there be loss of this contractility for 6 months recovery is doubtful,—if for one year it be lost, no improvement may be expected.

Treatment.—With our knowledge of the nature of the dis-

ease, and the pathological conditions existing, our efforts should be to restore the parts to normal if possible.

Removal of the cause is of first importance. Our efforts should be directed to the seat of the initial lesion.

Inflammation which has involved the cells of the anterior horn has produced the varied changes.

It is important for us to know whether there is within our reach any remedy, or remedies, which may prevent, or even modify the bad effects of the condition.

We must strike while the early stage of inflammation is on and arrest it before permanent injury is done, and the place for our attack is the seat of the inflammation.

Local Measures.—By some, poultices or fomentations are used over the part of the cord involved; cupping over the spine is also recommended; counterirritation is used, as in other deep seated inflammations; gentle massage about the parts is used to restore normal circulation.

Many drugs have been recommended for this affection.

Ergot stands at the head of the list and is thought by some to be the only medicine that can cut short the disease.

Strychnia, as a tonic and stimulant to the nervous system, is largely used.

Quinine and iron, bromides and iodides, are among the best remedies.

Some authorities express the opinion that there is no drug of any use in the early stages of this disease and it is useless to expect any good results from their administration.

While antagonistic views are held regarding the drug treatment of infantile paralysis, yet there is one remedy which every writer I have consulted recommends, and that remedy is electricity.

While generally used, yet a difference of opinion exists, as to the kind of current, method of, and time of, application.

The form of current preferred by many is the galvanic, or constant; using the uninterrupted form for its tonic effect upon the neurons, while the interrupted is used to give tone to the paralyzed muscles.

The induced, or faradic current is used in the early stages.

The constant current is used also for the purpose of reducing hyperemia of the cord, a consideration of first importance in

treatment, for upon *it* more than any other thing depends our success.

Sachs believes that in the acute stage the general condition *only* need be treated, and little attention be paid to the paralysis. He recommends quiet, antipyretics, applications to the spine, the administration of iodides, bromides, and ergot, and after the acute stage has passed, electricity, but he advises against the electrization of the spine, first, "because we do not know," he says, "that the electric current reaches the spine." Second, "a strong current makes the child restless." He says that the electric currents may improve the tone of muscles and nerves, but he will not say it increases conductive power of nerves.

To the above objections to the electrization of the spine, I wish to take exceptions.

First, because I believe that under proper electrical treatment every portion of the body is reached when the proper current is applied.

Second. The current may be so regulated that the child shall not experience any unpleasant sensations and is thus not rendered restless.

Third. That the power of conductivity will be increased in the nerve when we improve its tone, for, by so doing, we restore it to its normal, or more nearly normal condition, which is one of conductivity, and one which will be increased when its tone is improved.

Rotch expresses the opinion that we know of no rational treatment for the initial lesion, but the paralysis should be treated at once, and recommends that, to prevent atrophy, the limb should be supported to prevent stretching of ligaments, muscles and joints, and that the induced current should be used four or five times a week.

I must differ from the above opinion for I believe we *do* have a rational treatment for the initial lesion in this disease and to neglect to treat that lesion, the inflammation of the cord, we lose our golden opportunity, for this should receive our attention before anything else. The paralysis is a secondary matter. The *cause* of the paralysis should receive first attention.

It is because of my belief in the foregoing that I present the following relative to a treatment which has proven so satisfactory when early used.

I refer to the static electrical current. To my mind it is the

rational treatment of infantile paralysis, especially in its initial stage.

The static currents are currents of high potential and small quantity, or in other words the voltage is high, while the amperage is low.

The wave current was introduced by Dr. W. J. Morton of New York in 1899 and is designated the Morton wave current. Of this current Dr. Wm. Benham Snow of New York, formerly associated with Dr. Morton, says, "The great point of superiority characteristic of the wave current lies in the fact that it is an oscillating, one pole current, of high or low potential, and great or small frequency, under perfect control, painless during administration, and of such small quantity as to never endanger the life of the patient."

I quote the above because it embodies, in few words, the essential features claimed for the wave current, and because the reasons for its use, in cases of infantile paralysis, are clearly shown when we understand the essential features of this current.

The Morton wave current has a specific action of its own. It is a one pole current, having only one connection with the source of supply, or in other words, the patient, insulated, is connected with one pole of the machine only, either positive or negative, but usually with the positive side because it has been found in inflammatory conditions to be more tonic and sedative in its effects than the negative.

Application is made by metal plate which is connected, by conducting cords, to the static machine. The metal is used as a foot plate, or applied directly to the skin of the patient. For application to cavities and to mucous surfaces special metal electrodes are used.

The regulation of the spark gap between the sliding rods is one of the methods by which the current is controlled, and it is by this means that the patient receives the charge and discharge of the current. As the charge and discharge take place hundreds of times per minute, the patient receives an interrupted current in this manner, every part of the body receiving a share of the current so discharged, although the action is more pronounced, and the effect greater at the point where the electrode is applied. The treatment should cause no pain nor give any unpleasant sensations to the patient.

The wave current gives relief from pain and its effect is to lessen hyperemia and congestion, and these results are what we seek for, when treating cases of infantile paralysis.

For treatment of inflammation or congestion of the spine, a long electrode is used, which is intended to cover the diseased part. It is usually about one and a half or two inches wide, and of varying length, according to the area of the spine to be treated.

Length of treatment will depend upon the condition of the patient, but will usually consume ten to twenty minutes.

Upon the removal of the electrode its surface will be found to be covered with moisture as will also the part of the skin over which the treatment has been given.

The frequency of treatment will vary with each individual case, from daily to two or three times per week. I present the following case :

October 8, 1905, Ruth W., age five years, was on her way to church. While going up the church steps, her legs gave out, as her parents expressed it, and she fell. She was assisted to her feet and walked into church. During the remainder of Sunday she stumbled several times but did not fall, and this feature of the case, the stumbling, grew worse. Her father went away on Monday, and returned Tuesday night, and the condition was such, having become worse, that he consulted a physician, who sent her medicine. The next morning the physician saw her, and at this time she could scarcely walk and suffered considerable pain. She continued to grow worse until the following day when she was unable to stand or even move her limbs. She had a temperature of 102°. The next four days there was no apparent change in her condition.

On Monday the ninth day of her illness, she was still unable to use hands or feet, and was carried to the physician's office. Paralysis of legs and feet was complete and the patellar reflex was lost.

She was given treatment by static electricity, static insulation and the wave current being used; the latter by a metal plate along the cervical, dorsal and lumbar spine.

She was given a preparation of iron for tonic and the limbs were bathed with cocoanut oil and alcohol.

This treatment was continued for a month during which time she made a steady gain.

The family came to Portland for a visit and the child was brought to my office for treatment. She was reported very much better, but could not walk, was able just to stand alone. The paralysis was well marked, especially in the left leg and arm. She was brought to my office in a child's carriage. She had no pain but her condition was one of weakness and she was anemic. The patellar reflex was absent. She remained in Portland for more than a month and gained steadily under treatment. She received static treatment and when she left for her home she could walk with but little lameness. The left arm and leg had gained in strength, although there still remained a little impairment. During her stay in Portland she had gained very much in every way.

She returned to her home in Vermont and the static treatment was continued with very satisfactory results.

Nearly six months later she returned to Portland, and when she visited my office my records show that only a slight trace of the former paralysis remained, and her father stated that she could run about and play as she could previous to her sickness.

I next saw her at my office five weeks ago and I was unable to find any trace of the former disease. The reflexes were normal, and there was not a sign of paralysis or atrophy of the muscles, in fact she presented the appearance of a healthy child.

This case has brought to the attending physicians great satisfaction and we are convinced that the static treatment has produced excellent results, in this case, and much credit is due to Dr. Gilette of Wilmington, Vt., who applied this remedy in the early stages of the disease before destruction had resulted in the parts affected. The above case is illustrated of the results obtained by other physicians in this disease, and in others of a similar nature.

Dr. Wm. Benham Snow of New York, a man who has had a large experience with the use of static electricity, says in a book written by him, that "The congestive lesions of the brain and spinal cord are the most common causes of paralysis, therefore we look for the greatest measure of success from electrostatic administration in the earliest stages of this affection. It can be demonstrated that either the vibratory or electrical effect of currents of high potential, or the combined effects of both do materially and efficiently lessen deep local congestion, whether about joints or the spinal cord."

Among others, he cites two cases of infantile paralysis illustrative of results obtained by static treatment, the wave current being used.

One case was a child thirteen months old, referred to him in the following condition. Complete paralysis of both lower limbs except power to move toes on one foot, and reaction of degeneration was well marked; the child had been sick for six weeks. After the first treatment he could move the feet at ankle joints, and on each subsequent day there was additional power of motion and after six treatments he could move ankle, knee, and hip joints with ease and much force.

The second case was a boy, fifteen years of age, who was taken suddenly ill with infantile paralysis and rendered completely helpless. There was no gain at the end of two weeks, and atrophy was well marked. Dr. Snow was consulted in this case and he advised the use of static electricity. The boy was wrapped in blankets and carried to the physician's office, and electric treatment was begun. The wave current was used by metal plate over the whole spine and friction sparks were used. This treatment was given daily for two weeks and then every other day. Dr. Allen of Gouverneur, N. Y., whose case this was, and who consulted Dr. Snow, says that the effect of the treatment was almost magical.

After the sixth treatment he was able to walk through two rooms and continued to improve steadily. His left hand and arm were least responsive to the treatment and he did not regain the entire control until August, or five months after the attack, when he was able to play ball, row a boat, play football, etc.

Some atrophy of muscles remained but the doctor says he is fully satisfied that, had the treatment with electricity been commenced as soon as the disease appeared, the atrophy would have been prevented. Commenting upon the above case, Dr. Snow says: "The same results have been obtained in other cases, *and without exception*, when treatment has been instituted early."

Dr. Snow informs me that since the publication of his book he has seen many cases in which the value of the above treatment has been proven and excellent results obtained. If this treatment is administered early, the results are always good.

Dr. Allen also writes me that he has treated many cases since the one reported above with excellent results.

Dr. F. H. Morse of Boston, who has had twenty years' experience in special electrical practice, expresses to me his belief that electricity offers the only inducement for treatment in this disease.

Dr. E. C. Titus of New York has treated many cases of spinal affections by the wave current and has obtained fine results where the tonic effect was desired and where inflammatory conditions were present.

Summary.

The initial lesion of infantile paralysis is inflammation of the cells in the anterior horn of gray matter of the spinal cord.

An early diagnosis is of vital importance.

I believe that treatment should be given as early as the disease is diagnosed, and should be directed at the seat of the initial lesion; that the drug treatment is uncertain, to say the least, and that, electricity is our sheet-anchor; and static electricity the best form of current; and of the static modalities, the Morton wave current is the most potent and its use is the rational treatment of infantile paralysis.

156 Free Street.



Editorial.

THE PHYSICAL TREATMENT OF DERANGEMENTS OF THE GLANDULAR SYSTEM.

THE pathological processes found in the secreting glands of the human body clearly indicate the intelligent therapeutic employment of the physical agents for the restoration of normal conditions.

These when associated with hypertrophy or atrophy, hyperactivity or atony, or with low grade inflammatory processes, either infectious or non-infectious, can be easily managed in both early and late stages with better results from the employment of physical agents than by surgical or medicinal interference.

The *hyperactivity* of the glandular functions can be better met by the inhibitory influence of the x-ray than any other known physical agent—the intense penetrating ether vibration is quiescent in its influence,—inhibiting in physiological doses functional activities, and may be employed in right dosage without reserve to lessen an excessive activity of secretion of any of the glands of the human body. In exophthalmic goiter it not only relieves the glandular activity, but promotes when judiciously employed the reabsorption of adventitious tissue.

In such a condition as *Graves' disease*, however, it should be employed together with other mechanical measures which will effectively relieve the infiltration or excessive secretions present in the surrounding lymphatics as well as the accumulated products of the process present in the structures of the thyroid gland. In Graves' disease there are conditions also present suggestive of an infectious process which are likewise beneficially affected, as are the infectious processes generally by the inhibitory and sterilizing action of the Roentgen ray.

The static wave current and mechanical vibration are very energetic in relieving these processes and restoring the hyperactive metabolism to normal and are sufficient in early cases of Graves' disease, the later stages alone requiring the additional use of the Roentgen ray. In exophthalmic goiter attention to the hygiene and the restoration of functional activity to other parts of the organism are indicated as well. Under rational

treatment the tachycardia subsides, but the ophthalmia does not.

In *hyperidrosis* and conditions of increased functional activity the same rule holds good. In atonic or sluggish conditions of the glandular system the employment of light and heat together with the application of the static currents and other modalities, mechanical vibration or massage which mechanically awaken functional activities restore the function of secretion to the glandular system everywhere, in organs not organically impaired or abnormal in structure, are indicated. The daily scientific application of such measures to such conditions is invariably followed by a happy result in a few weeks—a condition impossible to derive from any surgical or medicinal procedure. In *hypertrophic* processes associated with low grade inflammatory conditions, non-infectious in character, before hyperplasia, the application of the static wave current or the vacuum tube taking the current directly from the machine as the wave current, will force out the infiltration by contracting the tissues and coincidentally restore normal tone and functional activity to the structures of the gland. This is true in all glandular conditions of this class including adenitis, prostatitis, mastitis, orchitis, or any other glandular structure large or small affected in this manner.

Where a condition of septic or other infection is present in a gland structure the prolonged application of intense light from an incandescent or arc light, focused sunlight, or the high frequency current employing a large amperage in a manner which will not induce tissue contraction, will in many cases destroy the infectious element *in situ*.

In other cases, infectious in character, as furunculosis, carbuncles and tubercular adenitis, the x-ray will be called into requisition, as it will, also, to facilitate the removal of low grade adventitious or hyperplastic tissue, leaving the parts finally in about a normal condition. The diminished activity of glandular and skin functions produced by the application of the x-ray, may be largely counteracted after the treatment is discontinued by a series of applications of artificial light and heat radiations.

At this time there is absolutely no question in the minds of those familiar with the subject as to the advisability of employ-

ing these measures in the treatment of a large class of conditions, which have for ages defied medicinal treatment, and in which surgery has been invoked only to dismember the part, with consequent functional impairment.

The medical profession except those who have investigated, and especially the surgeons, are very loath to recognize the true status of the mechanical measures in therapeutics. Those, however, who employ them daily have verified their effects over and over again, until it has become the universal rule in their hands to expect only favorable results and a degree of improvement relative to the organic or functional derangements of the parts treated. It only remains for the general acceptance of these facts by the profession at large, when there will be established a more assuring and virile therapeutics. Looked at from the purely physical point of view it seems impossible that the rational aspect under which those methods must present themselves to the thinking mind will not produce a spirit of investigation.

Human nature in all walks is loath to accept what has for centuries seemed to be impossible of accomplishment. In this the medical profession is no exception. If, however, those who are confident of these truths will ever contend for the principles involved, it will be but a few years before the great medical profession will not only indorse but embrace facilities which carry with them so much of significance to suffering humanity.

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NEW DEPARTMENT OF DERMATOLOGY.

IT is with pleasure that we announce that, commencing with this number, a department will be opened of dermatology in the JOURNAL. Dr. Herbert F. Pitcher of Haverhill, Mass., will act as editor of the department. We are certain that our readers under his management will appreciate the introduction of this department.

Physical therapeutics plays a most important rôle in dermatology, and while not appreciated fully as it should be by the rank and file of the dermatologists, these measures are certain to take the lead in the treatment of these cases in the future.

There are no other agents that can so well control the actions of the skin, inhibiting, stimulating, destroying fungoids and other processes characteristic of so many skin diseases.

* * *

THE MEETING OF THE AMERICAN MEDICAL ASSOCIATION AT ATLANTIC CITY.

AT the recent meeting of the American Medical Association the friends of physical therapeutics were agreed that the best method in the future for impressing the truths pregnant in that department of therapeutics, would be to carry the work of education into all of the Sections and not limit the field to a new Section of Physical Therapeutics. The large list of names enrolled for the purpose of petitioning the establishment of a new Section is a guarantee that the work will have enough advocates to carry on a campaign of education.

* * *

THE CONGRESS OF PHYSIOTHERAPY AT ROME.

THE Congress of Physiotherapy to be held at Rome, Italy, on the 13th, 14th, 15th, and 16th of October, 1907, has ample assurance of success. The large number of well known authorities who have enrolled themselves as taking an active interest in this and European countries is an assurance not only that the world is awakening to the value of these important measures, but that the progress made assures the general dissemination of this growing department of medical science. Any readers of the JOURNAL who are interested and would care to enroll themselves as members of this Congress should address the Secretary of the American Section, Wm. Benham Snow, 349 W. 57th Street, New York, for literature and membership blanks, after which they will receive the Bulletin of Adhesion and the Transactions, which will be published following the Congress. Those who expect to contribute papers to the Congress should mail them to Prof. Carlo Colombo, General Secretary, Via Plinio 1, Rome, with the membership fee of \$4.00, before the 1st of August, in order that they may be printed

prior to the meeting. Papers will be accepted in the English language and will be read in English, French, and German.

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EDITORIAL NOTES.

The Medical Association for Aid in the Prevention of War.

The American branch of the Association held a meeting at the Hotel Holmhurst, Atlantic City, on the evening of the 5th of June, 1907, and organized, re-electing the officers of the preceding year and electing a committee to draft the by-laws and to report at the next annual meeting of the Association to be held at the time and place of the meeting of the American Medical Association. The President and Secretary were authorized to nominate officers for state Associations throughout the country.

Meeting of the American Medical Editors' Association.

A meeting of the American Medical Editors' Association held at the Hotel Marlborough-Blenheim at Atlantic City on the 1st and 3d of June was largely attended and much interest manifested in the sessions. The papers were of unusual interest and presaged a strong organization for the future. Matters both of financial and literary interest were received with enthusiasm. A committee was appointed to invoke both the postal authorities of Canada and the United States to return to the old postage rates for the Medical Journals, not to exclude educational literature, or place it upon the same level with ordinary circular matter. The following officers were elected for the ensuing year. Dr. Chas. F. Taylor, Philadelphia, President; Dr. Wm. C. Abbott, Vice President; Dr. Joseph MacDonald, Jr., New York, Secretary.

Progress in Physical Therapeutics.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Roentgen Rays in Unresolved Pneumonia. Jour. A. M. A., March 16, 1907.

Edsall and Pemberton report the history of five cases who were treated by the Roentgen rays for unresolved pneumonia with most excellent results. The authors state (1) that "no results can be expected unless the duration of the condition has been reasonably short—a few weeks at the most, for if organization has occurred, a satisfactory result of treatment is almost unconceivable; (2) the condition should be chiefly a real lack of resolution and not a continued inflammation of the lungs; (3) it is exceedingly important to determine, so far as possible, that one is actually dealing with unresolved pneumonia and not tuberculosis. The treatment should be begun tentatively and with brief exposures and small doses, until it is determined in the individual case that serious results are not likely to ensue."

The editor of this department is glad to give the above quotation in its entirety. He can add to the number more than a half dozen cases of unresolved pneumonia sent to Denver for its climatic conditions that have fallen into his hands and have been treated with the Roentgen ray with exceptionally good results in every case. It is his opinion that the vast majority of unresolved pneumonias are really tubercular conditions, and the skiagraphs in his experience in every case have shown tubercular deposits elsewhere in the lung. The editor agrees with Edsall and Pemberton that the x-ray should be used with these cases and that it should be employed as early as possible. It has been used by him for as long a period as six months after the onset of pneumonia with favorable results both as regards the pneumonia and the tuberculosis as well.

Roentgen Ray in Rhinoscleroma. Jour. A. M. A., March 30, 1907.

Ball reports a case of rhinoscleroma in which the treatment was limited to the use of the Roentgen ray, the result being a

most satisfactory one. All the tumefied masses disappeared, although nasal respiration is not yet restored. Interesting features in this case are: its long duration, sixteen years; the complete freedom of the larynx from the disease; the large size of the nose, and the failure of all other forms of treatment to give any relief.

Roentgen Injuries in Medical Radiotherapy. Jour. A. M. A., February 23, 1907.

Engel of Budapest discusses to some extent the by-effects of radiotherapy as reported in literature and observed personally. In cases of mediastinal cancer he calls attention to the fact that suffocation and weakness with nausea was sometimes observed, which he thinks likely of psychic origin. Sometimes he noticed a papulous exanthem, with high and intermittent fever. He thinks this probably of toxic origin, caused by a destruction of tissue preceding exfoliation. The action of toxins liberated by the exposures is probably the cause of the fever in Roentgen treatment of leukemia and pseudo-leukemia. He reports an intense toxemia developed after 350 minutes exposure in the course of eleven days. The patient was a man of 54 with enlarged glands and spleen, 2,223,000 red and 246,000 white corpuscles, the general condition being good. The spleen, the neck and axilla on both sides were exposed to a high vacuum tube for five minutes each daily. The reds dropped to 1,900,000 and the whites to 110,000, but the exposures were continued until the figures were respectively 1,620,000 and 55,000. Then the treatment was suspended. The patient rapidly grew worse and succumbed from weakness of heart and diarrhea. Before treatment the condition had been very chronic and progressed much more rapidly after the treatment, probably explained by the toxemia. Krause has reported a case in which exposures aggregating 3,650 minutes had been given without harm. Schenck has also reported a case of rapid deterioration under Roentgen ray treatment of febrile leukemia. He summarizes the cases of sudden death as occurring after a course of Roentgen ray treatment. Now he thinks that no treatment should last more than two minutes and that the tube should not be nearer than 20 cm., or more than four minutes with the tube 35 cm. He thinks the same surface should not be exposed more than two or three times the same day and the exposed surface should be protected with tin foil and the vicinity with sheets of lead. He thinks the patient's susceptibility should be ascertained by a few brief exposures. After five or six exposures treatment should be suspended for a week, during which time careful pictures should be made of the blood condition, and at the slightest indication of toxemia, the treatment should be suspended indefinitely.

Roentgen Treatment of Exophthalmic Goiter.

Rudinger concludes his study of albumen metabolism under Roentgen exposures in two cases of exophthalmic goiter, with the advice to make a single tentative exposure of the thyroid in every case. The results may justify further treatment in this line, he says; especially if the previously abnormal breaking down of albumen is replaced by retention of the nitrogen after the exposure as in his case.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

The Routine Treatment and Complication of Typhoid Fever.

By Ray L. Wilbur, M. D., Clinical Excerpts, October, 1906.

The author calls attention to the variability in manifestation in different epidemics in different individuals at different ages and says that no definite rules for treatment are possible. He outlines somewhat in detail the diet and general measures to be followed and says:

"The most advisable plan for the treatment of a given case is the adoption of proper dietetic, hydrotherapeutic, and symptomatic measures. These, when carefully used, combined with absolute rest, and under the control of a good nurse, who has at her command facilities and orders for all ordinary emergencies, will not only give a low mortality rate, but will shorten the time spent in bed as well as add to the patient's comfort. After the patient has been put in a good bed, in a well-ventilated sunny room, and a competent nurse has been installed, the first duty of the physician is not only to provide careful written directions for all that is to be done, including the method of sterilization of discharges, and the signs and symptoms of the ordinary complications with their first treatment, but also to see that there are at hand the emergency drugs and supplies, including a simple saline infusion outfit, that may be needed. This involves a certain amount of expense, but in the long run will save time and life.

"Hand in hand with the feeding of the patient should go the administration of water, preferably plain, but some simple alkaline water such as Vichy if the urine is irritating. An effort should be made to give the water before the feedings and to keep track of the amount. Some patients will stand very large quantities and show a beneficial effect from its use. Its administration is logical and should be consistent. The addition of grape juice, weak tea or coffee to it will often make it more palatable and beneficial, particularly if the kidneys are inactive.

"Hydrotherapeutic Measures.—The simplest method for the reduction of the temperature is the combination of the abdominal coil and head ice-cap with sponge baths either cool, cold, or ice cold. While it is true that the benefit derived from the use of the coil is probably purely that of reducing the temperature, except perhaps in controlling the circulation of the abdomen, and not at all tonic or stimulating, as are the sponge baths, the combination of the two is most effective. Not only is one able to keep the temperature constantly from three-fourths of a degree to one and a half degrees lower than otherwise, but the sponges come less frequently and do not tax the patient so much. The coil should be kept on constantly, except perhaps for a short time in the morning, whenever the temperature is over 100° F. When the temperature is high it can be re-enforced with a second coil or a superimposed ice-cap. If the temperature rises over 102.5° or 103°, a tepid sponge should be given; if still higher a cold or ice cold sponge bath. If then the temperature is not affected, and the nervous symptoms are great, an ice pack or a sheet wrung out of ice water applied with fairly vigorous rubbing of the trunk and limbs is best used. Occasionally the coil is not well borne, particularly by fat, weak or anemic individuals, and its use should then be only partial or completely discontinued. In some cases even the sponging seems to do harm and to lead to continued cyanosis and chills. Such patients do better without the use of cold at all, and one for comfort need only remember the countless people alive to-day who have gone through typhoid, not only without water externally, but frequently with almost none at all internally.

"While the system of tub baths does admirably for hospital routine, and while its mortality results have been satisfactory, I do not feel that such baths need be introduced in the care of private patients, particularly where attentive nurses are at hand. Their use in many cases seems to be needlessly severe. The amount of shock is out of proportion to the good accomplished, and the amount of movement required is a great objection where there is any liability of hemorrhage and perforation—and such liability is present in most cases of typhoid. There is a wide difference in the susceptibility of individuals to hydrotherapeutic measures, and because such satisfactory results have been obtained by tub baths this does not mean that each individual must be put through that routine in order to better his chances of coming out alive from the disease. The general point, it seems to me, is the adaptation of hydrotherapeutic procedures as well as the diet to the individual, rather than to try to force our patients through an inflexible treatment in the hope that all but six or seven in a hundred will escape with their lives."

Artificial Nauheim Baths in Heart Disease.

The bath employed by Brown is merely a bicarbonate of soda and acid sodium sulphate bath without the chloride. He says that the cases peculiarly fitted for the Nauheim treatment are those in which the heart muscle acts insufficiently, either from dilatation, poor blood supply or arteriosclerosis with changes in the muscle; poisoning, notably tobacco poisoning, and fatty changes of moderate degree. Brown does not believe that the use of resisted movements with the Nauheim baths is essential. They are often very tiresome to the patient and are dangerous in bad cases, unless given by a person who understands fully the purposes of them and who realizes that every case is a law unto itself. In his experience Brown has found it best to give these exercises an hour or two before the bath, and when this is not possible, a number of hours after the bath. He has found massage in connection with the treatments of advantage, particularly when the temperature of the bath was below 90.

The Hydrotherapeutic Treatment of Membranous Croup.

Sadger says that in 1821 Harder commenced the treatment of membranous croup by means of water and since that time there have been reported by many writers and others remarkable results and cures of the malady.

Based upon the idea of Winternitz that there is a paresis of the posterior crico-arytenoid muscles. This paralysis is to be overcome by powerful mechanical and thermic stimuli which will affect the respiratory centers. The author says that the aim seems to be to introduce a powerful revulsion by a sudden douche of cold water as originated by Winternitz. In the four cases that he reports the treatment was eminently successful and the following technic was employed. The body of the patient was first rubbed with sponges dripping with water at 10° C. (50° F.) for six minutes. (The writer of this editorial would here suggest that instead of sponges a rough crash rag be employed, as it is more cleanly and produces greater friction with a better resulting dilatation of the blood vessels.) During or immediately after this application the head and nape of the neck were repeatedly doused with cold water, falling from a height upon the patient. In the interim, wet packs were employed and the treatment maintained at intervals (say every three or four hours) until the pulse and temperature had returned to or about the normal. In those cases in which the temperature is low the child is placed in a warm bath before giving the douche. As the natural result of the forcible impact of cold water applied under mechanical pressure powerful reflex effects result, stimulating the respiratory center as well as muscles of forced expiration, so that in the cases reported large amounts of false membrane were coughed up and expelled. This treatment will strike American confrères as rather

"heroic" and this must have been the feeling of Sadger, for he says in conclusion that we should bear in mind Priessnitz's saying "that water treatment takes character," which applies to the physician as well as the patient, and further notes that half-hearted water measures do more harm than good.

In the experience of one writer who treated twenty-eight cases in ten years, all of his little patients recovered but he adhered to the strict method. This writer repeated the douche whenever the breathing became difficult and the croupy cough occurred, and where there is much fever he has recourse to cold sponging before the douche is used.

The suddenness of the douche is an essential feature as it causes the child to take a deep inspiration, to struggle, followed by strong coughing and expiration. After five or six douches the child is generally so much improved that it asks for food and generally falls into a refreshing sleep after each application.

It is to be regretted that with these facts before us and the knowledge that the reintroduction of hydrotherapy in the treatment of croup would cure so many cases will not lead the American physician to increase the proportion of his recoveries by early and prompt institution of methods that will do no harm but save many human lives from a tragic end.

THERMOTHERAPY.

EDITED BY DAVID E. HOAG, M. D.

Thermotherapy. By W. Gilman Thompson, M. D. New York Medical Record, April, 1907.

Thompson has brought out in this article what has been so often emphasized in these columns, that we must not have an exaggerated opinion of any certain form of therapy. Medical men are prone to error in this way; in other words, to get a hobby and ride it without producing any scientific data to substantiate the authenticity of their statements. It has long been very well known that heat in various forms is one of the most useful forms of therapy, but it must be borne in mind that it should be an adjunct only to other forms of treatment. Dr. Thompson firmly believes that the topical application of thermotherapy is of little if any value in controlling deep-seated visceral hemorrhages, congestions or inflammations. His experiments demonstrate that the ordinary means of applying local heat and cold to the surface completely fail to affect the temperature of structures lying beneath the skin to any practical extent, so long as the peripheral circulation remains active. He believes furthermore, however, that thermotherapy as applied to the peripheral structures of the body is of so much importance that more adequate facilities should be pro-

vided for its employment. These opinions based upon deductions from a series of scientific experiments coming from this high authority in medical matters generally, should have much weight with the profession. Dr. Thompson lays stress upon the lack of equipment in our large general hospitals for methods of treatment which are proving of increasing usefulness as they are better understood. In many a hospital in New York City the sole bathing outfit for a large general ward consists of a small tub placed against the wall, usually in a water-closet, an arrangement as inadequate as it is unhygienic and unesthetic. For this reason a very large class of patients suffering from chronic diseases, such as gout, rheumatism, neuritis, and a variety of muscular atrophies, sciatica, lumbago, etc., can receive no satisfactory treatment. What they really need is not to be put to bed and given potassium iodide, but a thorough course of local thermotherapy combined with hydrotherapy, massage, and other manipulations, fresh air and hygiene. No modern foreign hospital is regarded as complete without an establishment comprising a series of rooms fitted with every kind of apparatus for using physical therapy, such as local and general hot-air baths, electric-light baths, massage, vibration, etc. Dr. Thompson believes that the topical application of heat and cold in the treatment of diseased processes, although one of the oldest known therapeutic measures, has been greatly modified, owing to the progress of physiology, pathology, and the surgery of localized pyogenic inflammations, and that in general, while the development of peripheral local thermotherapy has been greatly advanced by improved technique, on the other hand, there is increasing skepticism as to the possibility of modifying deep-seated inflammations or congestions. The series of experiments conducted were both thorough and scientific and were made upon the living animals under anesthesia, and upon the cadaver, supplemented from time to time by further researches upon the human body. Special thermometers, similar to those employed by beer brewers, were used. The thermometers were long and slender with small bulbs, possessing a wide range of index, not self-registering, so that fluctuations alternating both above and below the normal body temperature were promptly observable. The effects of poultices were experimented with by using three thermometers simultaneously; one inserted in the poultice itself, one placed between the poultice and the skin, and one in some cavity of the body immediately beneath the poultice. In anesthetized animals punctures were made into various cavities of the body, and thermometers inserted at various depths beneath the site of application of the poultice. In the living human subject thermometers were inserted in the buccal cavity, in the bladder, and deeply into the thorax, in several cases of post-operative empyema with long sinuses.

In the human cavader punctures were made in the abdominal wall and thorax and thermometers inserted and held against the inner surfaces of the wall while poultices, ice-bags, ice, coils, etc., were applied in alternation immediately external to the thermometer bulbs. The results in all cases were most striking and proved that so long as the normal peripheral circulation is maintained neither extremes of local heat or cold possessed penetrating power of any practical importance whatsoever. As soon as an animal is killed, however, and the circulation ceases, or if the experiment be tried upon the human cavader, extremes of both heat and cold acquire considerable penetrating effect. Patients vary very much in their ability to tolerate external local heat, and there is moreover much difference on the various parts of the body. A poultice made by adding boiling water to meal usually cools down to about 140° to 145° F. before it can be applied to the patient. Usually a hotter poultice can be borne over the face than elsewhere, and here a temperature of 150° may be endured. In experiments with both heat and cold upon an anesthetized dog, it was found that very little effect was produced upon the temperature. It was, however, observed that the application of cold produced a relatively greater effect than that of heat. This is doubtless due to the fact that the source of heat, the poultice, is steadily and rapidly cooling off, whereas the source of cold, the ice water, remains constant. These experiments, however, were made in 1890, before the days of the electric heating pads (now so commonly used), in which the source of heat supply remains a constant quantity. Dr. Thompson refers to some cases of his several years ago in the hospital, who for various reasons had worn large cold coils over the abdomen and pelvis for several days almost continuously: each one developed a marked cystitis, although neither one had been catheterized or had gonorrhea. It is a matter of conjecture whether this occurrence was a mere coincidence or whether the cold had in some manner reduced the resisting power of the bladder. The question to what extent the heart may be influenced by local external thermic application is then taken up in the article. Dr. Thompson is rather of the speculative opinion that in patients with some heart affection, palpitation, rapid heart, angina pectoris, etc., where either cold or hot applications are recommended and the patient is told to lie down, that it is barely possible that the remedial effect is principally due to the recumbent position, the quiet, and a certain psychic effect. The chief interest of these experiments concerns the common employment of topical cold for supposed influence in arresting deep internal hemorrhage upon the lung, the stomach, or the intestine. The writer further states that he has never been convinced that the use of ice-bags, poultices, cold wet

compresses, or ice-coils, is of any value whatever, beyond the fact that they may be somewhat soothing to the surface, and to balance them in position the patient must lie quiet upon the back. Rest and possibly the morphine commonly given in such cases are the real factors, as it cannot be proven that the caliber of deep-seated vessels is sufficiently modified to exert any astringent effect. Similarly the swallowing of cracked ice for control of hemoptysis, or hematemesis is useless, for the ice is melted in the mouth and the ice water in its slow passage through the esophagus is warmed by the blood vessels long before it reaches the stomach. It may serve to allay somewhat the patient's anxiety if he shares the popular belief in its efficacy, but it is without scientific reason. The common practice of poulticing the lumbar region to relieve congestion of the kidneys, it may be similarly argued that these organs lie too remote from the surface to be affected by any degree of heat penetration. The articles claiming "cures" for pneumonia by either continued poulticing or local refrigeration, which were so common in medical literature fifteen and twenty years ago have well-nigh ceased to appear altogether, doubtless owing to a broader conception of the pathology of the disease. In depreciating the value of topical thermotherapy for deep-seated hemorrhages, congestions, and inflammation, it is by no means intended to reflect upon the value of such treatment for the relief of visceral pains. To do so would be to oppose universal experience. Most certainly the pain of pleurisy is relieved by local hot or cold applications as the case may be, just as gastralgia and enteralgia and the various abdominal colics are relieved and often cured by a poultice or hot-water bag. But such relief is quite apart from any question of vasomotor influences through direct caloric transmission, and is explainable rather upon the obscure reflex relationship between the cutaneous nerves and the nerves of the viscera most nearly related to them topographically.

MECHANICAL VIBRATION-THERAPY.

EDITED BY FREDERICK H. MORSE, M. D.

Treatment of Sciatica by the Vibrator. By F. L. Keeler, M.D. Medical Council, April, 1907.

After considering the cause and general pathology, the writer observes that when the sciatic is affected we will find tenderness over the spinal nerve roots in the lumbar region where, he states, most of the trouble lies. The apparatus required for treatment is a substantial vibrator with a variable length of stroke. The writer employs the following method.

Placing the patient on the table in about the Sims position, he applies first the medium soft electrode to the lumbar and sacral nerve roots, using medium pressure with as long a stroke as the tenderness will permit; he also applies the vibrator along the whole length of the spine to locate other tender points, vibrating each until the pain and tenderness will disappear. Painful points along the sciatic or its branches are treated in a similar manner. Treatment of this kind requires from ten to fifteen minutes, and should be given every day for three or four days, or until better, and then once or twice a week. The writer states that he has never failed to relieve acute sciatica in one treatment, and in most cases two or three treatments will effect a cure. With chronic cases more time is required.

STATIC ELECTRICITY.

"The Evolution of the Static Machine."

In a communication published in a recent issue of Medical Electrology and Radiology, Dr. C. Muthu reviews the evolution of the static machine from the period of the brilliant experiments of Abbé Mollet, in the year 1734, up to the present time.

Dr. Muthu carefully reviews the various modifications of the static machine by Ramsden, who used circular glass plates instead of the cylinder, in 1760, the classic work of Cavallo and others.

After describing the various forms and modifications of the modern static machine, he gives in detail a description of a modified Wimshurst machine invented by himself, which is as follows:

"During the last few years England has followed the lead of France and America and is trying to wipe out the reproach that she has lagged behind in the construction of electro-static machines. In 1898 Schwind produced a Wimshurst machine with large glass plates with sectors, and inclosed in a glass case, which is now being made by Watson & Sons, London.

"In 1902 Dean, of London, improved the French machine by making it of heavier construction and devising an ingenious means of detaching each plate without disturbing its neighbor, and adding a new type of brush gear which is quite demonstrable.

"The writer, who has devoted some years to the study of electro-static machines, had one constructed for him by Dean in which he claims to combine all the improvements of previous machines, and to produce more current than any other

static machine of the same plate diameter driven at equal velocity. It will be his privilege to introduce his machine for the first time before his readers, and to describe the mechanism of its construction.

"In the writer's experience the following are some of the most important factors which go to improve the efficiency of a static machine :

"1. He believes in the open machine. It is better that the static machine should be open to fresh dry air. When it is closed in, the inclosed air is ionized, and acrid products settle on the plate and metal parts, which short-circuit the machine and impair its efficiency. The writer has been using an open machine for some years, and, provided it is kept dry, it has given him no trouble except in summer, thundery weather. Of course, the room in which the machine stands should be kept warm and dry by artificial heat.

"2. The machine must have a speed of 600 to 1,000 revolutions per minute. As the glass plates of a Wimshurst cannot be run with safety at more than 400 to 500 revolutions per minute, the plates should be made of more tensile material, such as mecanite, ebonite, or, better still, hard rubber.

"3. To produce a current of average capacity of volume and intensity efficient for therapeutic and X-ray work, a static must have at least twelve plates, each measuring 24 inches in diameter, which will give an average of 12-inch spark.

"4. One of the most important points which the makers of static machines have hitherto lost sight of is that all the plates of a machine must move at a definite and synchronous speed. This is impossible with machines driven by belts or straps, as they slip or become slack or disconnected, causing dislocation of the static field. Just as a slow horse harnessed to a fast one retards the progress of the latter, so the slow plates impede the speed of the working plates and dissipate their energy.

"5. To cleanse thoroughly all the parts of the machine of dust or carbon which get deposited in it while running, to change or straighten a buckled plate, the machine should be made with a device for quickly detaching the plates, the prime conductors, and the brushes.

"6. The bearings of the machine should be free from friction, and be provided with lubricators to waste as little energy as possible.

"7. The machine should be provided with accessories for exciting a Crookes tube and for x-ray work.

"8. For using alternating or interrupted currents provision must be made for Leyden jars to be connected by their internal armatures to the prime conductors.

"9. The insulated stool is an important factor to efficient treatment, and should be supported on glass legs not less than nine to ten inches in length.

"The writer has embodied all the above essentials in the construction of his machine. The following is the summary of the chief points and advantages of his machine:

"1. The machine is built on a solid iron base and works without a case or cover of any description.

"2. The plates are sectorless and are made of hard rubber, and measure 24 inches in diameter, giving out a spark of 12 to 14 inches.

"3. All the plates move at one speed and in opposite directions. This is accomplished by the mechanical method of gearing equally by toothed wheels, both main shaft and counter-shaft. Fixed on the shafts are the sprocket wheels all of equal pitch and diameter, connected by chains to the spindles to which the revolving plates are attached. The chains pass up the hollow columns which support the plates. These columns are secured to a base plate by bolts, and on the underneath side are bolted to the bearings of shaft and counter-shaft, so that the machine may be said to be confined to the side-plate, which forms a moth-block for the production of synchronous speed to the plates.

"4. All the mechanical arrangements are out of sight.

"5. Every plate can be easily detached for cleaning and other purposes.

"6. To facilitate the cleaning of prime conductors a second rod is constructed, which is connected with the condenser.

"7. The brush holders move in all positions, and press equally on all the plates.

"8. Liberal lubrication is provided; those of the shaft and counter-shaft have grease boxes under the side plate.

"9. In radiography the machine is provided with an additional apparatus consisting of a pair of detonators or small spark-gaps for each pole of the machine, and a spintermeter.

"10. Leyden jar accessories are also provided, so that the machine can produce continuous, alternating, or interrupted currents.

"11. A Giessler tube attachment is made to determine the polarity of the machine.

"Such are the essential features of the new machine which would make for increased efficiency for therapeutic work."

The writer of this article shows a want of familiarity with the construction of the static machine from the American point of view. The objections which he raises to the inclosed air are readily overcome by the presence of reagents such as C. P. sulphuric acid or oxide of lime within the case, not only to keep the air dry, but the lime, particularly, engages to a large extent the nitrous acid fumes within the case. The writer's claim that the machine will work in the open to the satisfaction

of the physician who wishes to use it every day for treatment purposes, is quite unusual in the experience of those who make daily use of the static machine, whereas in the climate of London, or even Honolulu, with properly closed cases and careful provision of reagents within the case, the machine may be operated every day in the year. In this country no difficulty is found in successfully operating the inclosed static machine with leather belts. Experience has shown the users of static machines in this country that the vulcanite plates are apt to become warped, which greatly impairs their usefulness, while the well-shellaced glass plate is free from this objection. The point of view of the manufacturer is to be questioned by the practical physician who makes daily use of the apparatus. It is easily conceived both from the literature on the subject and the apparatus produced abroad that this form of electricity has not attained to the high degree of perfection either in point of mechanism or therapeutic employment that it has in this country. [EDITOR.]

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

The Cure of Unilateral Renal Hematuria by Injection of Adrenalin through a Ureter Catheter. By Hugh H. Young.
Jour. A. M. A., May 18, 1907.

Describes a case in which recovery followed shortly after the injection of adrenalin through a ureteral catheter. A complete history and notes are given. The etiology, diagnosis and prognosis of the condition are briefly discussed.

The Action of the Extract of the Suprarenal Gland and the Method and Indications for Its Use. By Joseph L. Miller.
Jour. A. M. A., of May 18, 1907.

In this article he considers its use locally, in cardiovascular conditions, remote hemorrhages, bronchial asthma and pleural and peritoneal effusions. He deems the chief dangers to be rupture of an artery from sudden increase in pressure, glycosuria, and arterial degeneration.

Early Local Reaction to Tuberculin a Sign of Tuberculosis.

In the Journal of the American Medical Association for June 15, 1907, is described a new method advocated by von

Pirquet of applying tuberculin for the diagnosis of tuberculosis. A few drops of tuberculin are applied to the arm and scratched in a manner similar to vaccinating against small-pox. The diagnosis is made by the development, in individuals infected with tuberculous lesions, of an antibody reaction, a small papule at the site of inoculation. Von Pirquet was first led to employ this method by observing that in vaccinating against small-pox, individuals who had been previously vaccinated presented at the site of inoculation a similar lesion, a small papule, which appeared within the first twenty-four hours, disappearing usually within a week. The reaction he claims is specific. He found it most marked in individuals with lymphatic and osteal tuberculosis.

Case of Tuberculous Meningitis in Boy Treated with Tuberculin: Recovery: Recurrence and Death. By Alexander Don. British Medical Journal, June 8, 1907.

Describes such a case. During the period of recovery which lasted two weeks, there still remained some hyperesthesia and hemi-facial paresis. Though the symptoms and course correspond closely, in all but the marked remission, to those of tuberculous meningitis, yet, in view of the extremely atypical picture that some of the cases of epidemic cerebro-spinal meningitis present, it is to be regretted that a lumbar puncture was not performed.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

In accepting the editorship of the department on Dermatology, I do so with a feeling of diffidence, fully appreciating the magnitude of this important branch of medicine. For a long time I have realized the need of more discussion and dissemination of knowledge as we understand the treatment of diseases of the skin at the present time. When we consider the change in treatment in the past two years, it is like looking back into the dark ages. In diseases like lupus, psoriasis, acne vulgaris, chronic eczema and many of the infectious diseases of the skin caused by vegetable micro-organisms, the old methods of treatment are practically nil; and yet many of the standard text-books on skin diseases published to-day say very little or nothing about physical therapy. "There are none so blind as those who will not see, and none so deaf as those who will not hear."

All physicians using physical methods of treatment become in more or less degree workers in the field of dermatology.

Consequently, to obtain the best results we need a dissemination of this knowledge. At the present time there are many minds any many methods; everyone using physical methods should become an investigator along the various lines, including the Roentgen ray, ultra violet light, incandescent light, vibratory stimulation, or from one or more of the electrical currents; being particular to give as full descriptions of the technique employed as possible, for by this means alone can we arrive at any means of precision. If we wish to successfully treat skin diseases, we must arrive at a correct diagnosis in the first place, and then determine the underlying cause of the disturbance.

A most common error is made in treating the skin as an independent organ. We must always remember that not only has the patient a skin, but that the skin has a patient inside of it. We must take a broad view of every skin disease. Not only must we consider the pathology of the particular skin lesion, but also the physiology and conditions of the general economy. Whatever the modality or remedy we use for the local manifestation—the constitutional treatment should never be lost sight of. Dietetic and hygienic rules should be enforced, and any irregular habits corrected; physical exercise should be outlined, and out-of-door life insisted upon if possible. We not only wish to cure our patients for the time being, but we want them to remain cured.

With our physical methods we stimulate metabolism and eliminate the toxins. As yet dermatologists know very little in regard to the relation of the lymphatics to skin diseases, but we who use physical methods know that by stimulating the lymphatic glands we obtain results never obtained by any other remedy. We have already accomplished much, but we have only reached the plain from which we can see the heights beyond. If we obtain satisfactory results in a few cases; why not in all? Let us study more thoroughly our patients, the diseased condition, the modality we use, and report our results.

H. F. P.

Symposium on Radiotherapy in Skin Diseases.

In the April number of the American Journal of Dermatology appears a symposium on radio-therapy in skin diseases. The contributors to this symposium number some of the best known men connected with the work. The questions proposed are as follows: (1) Are the Roentgen rays really beneficial in the treatment of diseases of the skin? (2) If not, what are the causes and reasons for this failure? (3) When are the rays contra-indicated, and why? (4) In what diseases are they of undoubted benefit? (5) At what distance from the skin is the tube to be used? (6) Do you use a high or a low vacuum tube? (7) What is the average length of a sitting, and

how many are given? (8) At what intervals are the treatments given? (9) Does the use of Roentgen rays produce permanent benefit or cures? (10) In your opinion, is the use of these rays to be recommended?

Henry G. Piffard, M. D., of New York City is the first contributor. He thinks the Roentgen rays are sometimes beneficial in the treatment of skin diseases. The failures are due to unsuitable selection of cases, or ignorance on the part of the operator. He says the rays sometimes produce permanent cures. In trichophytosis capitis, mycosis fungoides, and a limited number of cases of lupus and epithelioma, the rays are of undoubted benefit. A soft tube should be used. As to the distance from the skin the tube is to be used, Beloit's rule is a good one, *i. e.*, the target should be at a distance equal, at least, to twice the diameter of the lesion. No general rule can be given for the length, number, or intervals of sittings.

The rays are contra-indicated when the patients can be cured more quickly and more cheaply by other means. The above is practically the opinion of Dr. Wm. S. Gotthel of New York City. He uses a soft tube and when possible in contact with the affected skin, average length of sessions six minutes, at intervals of three days.

Dr. Hartlung, of Breslau, Germany, has used the rays for several years in all cases where indicated, and obtained in part very good results.

He avoids this treatment in patients who manifest marked vasomotor disturbances or in atrophies of the skin.

His best results have been in dermatomycosis, especially in the thickened infiltration of parasitic sycosis. Also in lupus the results were good, especially when the rays were applied after unsuccessful Finsen treatment, also in flat carcinomas of the skin the Roentgen ray proved successful.

The treatment of psoriasis was without value in his hands. He employs a medium tube at a distance of 25 centimeters, sittings of ten minutes, from two to three times a week.

Dr. Wm. J. Morton of New York considers the rays of real benefit in diseases of the skin; he believes that time will establish them a most important ally to the dermatologist. With this treatment he feels pretty sure of curing most cases of eczema. It is simply necessary to get a mild reaction and watch for the subsidence of the main trouble. Also in psoriasis he finds the x-ray invaluable, as well as in skin cancer and in many cases of lupus which are superficial. The effect in carbuncle and furuncle is remarkable as well as in cases of acne. Dr. Morton uses a high vacuum tube, nine inches from the target, four times weekly, ten minutes at a sitting.

(To be continued.)

SOCIETY MEETINGS.**MEETING OF THE AMERICAN ASSOCIATION FOR
AID IN THE PREVENTION OF WAR.**

At the first annual meeting of the American Association for Aid in the Prevention of War held at the Hotel Holmhurst, Atlantic City, N. J., June 5, 1907, the meeting was called to order by the president.

President's address :

THE PHYSICIAN IN THE UNIVERSAL PEACE MOVEMENT.*

BY WILLIAM BENHAM SNOW, M. D., NEW YORK.

The march of civilization has been marked by an ever increasing recognition and protection of the rights of the individual of high or low estate in contra-distinction with the dominant spirit of the favored ruling classes of other ages.

The example and precepts of the humble Nazerene, handed down through the centuries, has illumined the mind of mankind, softening and supplanting the barbarous impulses of the feudal ages through growth of appreciation of the beautiful sentiments of the Prince of Peace.

One by one the autocracies have crumbled, giving place to constitutional governments, passing on to the establishment of the grandest type of nations—the purely republican form of government—a government of the people—in which, in principle, every individual is equal before the law. The grand climax of progress must eventually be a congress of all nations when in the fullness of time the rights of each one will be protected as are the rights of individuals.

As Christianity has extended, and the great error of the Middle Ages—the union of church and state—has become practically a thing of the past, new inspirations have awakened the sentiments of mankind; for released from a dominant priesthood, the spirit of freedom with a sense of individual responsibility and brotherly love, has become more universal within the Christian nations. When human selfishness and greed have not taken too fast hold upon the individual, humanitarianism becomes the dominant impulse.

* President's address at the First Annual meeting of the American Medical Association for Aid in the Prevention of War.

A great philanthropic movement the fruit of such sentiments has been inaugurated, looking to the establishment of "*universal peace*." Conferences have been held in which great progress has been made towards its accomplishment. A common meeting place endowed by a patriotic citizen of our country with a grand edifice has been established, where the congress of nations will meet to make laws which in good time will regulate the affairs of the nations of the earth. When the universal sentiments of right and justice prevail, an end will be put forever to international warfare.

In this great movement, which has been inaugurated to mold the sentiments of mankind, shaping the destinies of the generations that are to follow, every organized body—the members of every profession and calling have a duty to perform in aiding to promote an object so grand in its conception and so noble in its purpose.

To the great medical profession, humanitarian in all its labors and sentiments, naturally a share of this responsibility falls. The physician in his calling, brought as he is in the closest relations with mankind in his sternest moments and most trying ordeals at home, and in war upon the battle fields, grows mellow in his feelings of sympathy and forbearance with human frailty, and will not shirk the duty but do his part in bettering the conditions of mankind.

His consideration develops into kindness; yea, a brotherly love for the suffering; and his deeds are generally so generously appreciated by the sufferers, that he often wields a greater influence for good in the community than those in other callings.

The physician has in all ages been among the foremost in all movements which have had for their purpose the betterment of the conditions of his follows. His virtues as physician have not generally been paraded for any purpose by himself, but as poet, statesman, and a leader of men his intelligent influence has ever been a power in the community. Collectively the profession will now by its influence aid in this great movement for the betterment of mankind.

The object of the International Medical Association for Aid in the Prevention of War is that our profession in accord with its humanitarian sentiments may unitedly exert an influence in the direction of the promulgation of *universal peace*.

As Dr. Rivière and his confrères have instituted the move-

ment upon the continent of Europe by the formation of an International Association, now let the American Physicians take it up and, in our respective communities and wherever and whenever we can, lend our voices and encouragement to aid in the establishment of this, the grandest movement of the twentieth century; and let it be done with a steadfast purpose that in this connection our thoughts and energies shall be engaged to insure its early fulfillment.

In order that this may be a national movement and far reaching in character, and that it may influence the public sentiment of every state and county in this broad land, let a nucleus be formed in each state by the appointment of one or more live men interested in the cause, who shall organize a State Association which will hold a meeting at or about the time or place of the annual meeting of every State Medical Association, and let the members of each County Association annually send delegates to a meeting of the State Medical Association for Aid in Prevention of War and the State Association elect delegates to an annual meeting of the American Medical Association for Aid in the Prevention of War, such meeting to be held at the time and place of the meeting of the American Medical Association. At such meetings the session would require but one evening and should be held in conjunction with the citizens of the place in which the sessions are held, and in a public place provided by the philanthropic people interested in the sentiments of universal peace. At such meeting the business transacted should be interspersed with short papers or orations by members of the profession and others for the purpose of arousing the public and the profession at large, that through their efforts and interest the public may be influenced to a more general appreciation of the grandeur of this humanitarian movement.

In such Association the medical profession will take an important part, lending its influence to hasten the day when the nations of the world will forge their cannons into implements of commerce, converting their men of war into merchant marine. In that day of the triumph of humane principles the armies and navies of the world will find employment in the more honorable arts of peace.

(To be continued.)

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CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

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INTRODUCTORY.

That the terrible scourge of humanity embraced in the various malignant affections commonly called cancer demands our earnest attention, as a profession and as a people, needs no emphasis when the figures showing its increase in civilized lands are considered. The double showing of recently established facts, which indicate that cancerous diseases are on the increase and that they are primarily local, places an immense responsibility on the members of the medical profession, who can no longer fold their hands with honest sorrow on the discovery that a valued life is threatened by a malignant growth. Their sorrow cannot be entirely free from a sense of unfulfilled duty if it has been in their power to remove the disease soon after its inception; and if this may not have been in their power by reason of the ignorance or inattention of the patient, who for these reasons failed to seek aid in time, the responsibility of the medical profession, as a whole, still remains, for it is the duty of educated physicians to correct the popular impression that cancer is a hopeless disease from its inception in the great majority of cases. Indeed, in view of recent legislation in the interest of public health, it would seem appropriate that the attention of the various state legislatures be called to this subject in order that proper measures be adopted to arrest an apparently endemic affection so greatly on the increase as to be rivaled by but three other maladies as a destroyer of mankind—an affection, indeed, that is even more fatal than tuberculosis in its inroads on the adult population. But, whether the aid of the authorities in stamping out this disease

can be properly secured at present or not, the most powerful instrumentality in attaining this end will remain in the medical profession, which should educate its patients and the public to the point that would lead to the early destruction of all suspicious growths. That physicians who tell their patients "Don't touch a cancer until you have to" are more than derelict in this duty is evident. Nothing better can be expected until a higher sense of responsibility leads to a closer acquaintance with the modern facts involved in the formulation of an opinion. Until then we shall continue to see a host of incurable patients who were not urged to seek early relief, and the knife, as well as newer, and it is to be hoped, better methods, will be sought only when it is too late.

This hopeless attitude towards cancer is largely due to incorrect views of its nature, and to incorrect views of the importance of heredity in its prevalence. The old idea that its local manifestations were the "pointings" of a constitutional disease was never really held by those who were in the best position to know anything of the matter, and it is high time that the impression that this is so be definitely displaced by the teaching of scientific facts in favor of the view that the disease is a primarily local foreign invasion. To complete this important change in the popular conception of the disease it is also necessary that statisticians also recognize these facts and no longer class cancer among the constitutional diseases, as now generally done.

Concerning heredity, we are now in a position to deny that cancer is actually transmitted by inheritance, even in cases occurring in infants and clearly congenital, for, like the instances to be found in this work, these children are born of parents showing no sign of the disease. The greater prevalence of cancer in certain families apparently means merely that these families inherit a type of cell structure that presents less resistance to the implantation of the germ. It follows from this that a person who springs from a family in which a number of cases has occurred is not necessarily doomed to the same experience, but merely possesses a constitution which demands that greater care be observed in the maintenance of robust health, and a constitution that exacts greater vigilance in the early recognition and prompt destruction of suspicious growths.

With proper attention to these two factors of prevention, there is no reason why an individual with this family history should not secure greater exemption from malignant disease than the general public, even in the present state of our knowledge of the causation of the affection. It is quite possible, even, that some of these instances of successive infections in the same family may not be due to a less-than-average immunity but to an exposure to the same source of infection, whatever that may be.

In spite, therefore, of our still incomplete knowledge of certain important scientific relations of the cancer cell, it is utterly folly to allude to the subject of cancer as still a *terra incognita*. As a profession and as a people we know far more about cancer than we act upon. We know, with absolute certainty, that cancer begins as a purely local growth, with at this time only such relation to the rest of the body as is involved in the probable susceptibility to the implantation or development of this local growth. Destroy or remove this local growth in this stage, and the remainder of the body will be as free from the disease as if it had never been present.

The prevalent attitude of many well-meaning physicians who practically fold their hands and wait for the discovery of some wonderful antitoxin to help the vital forces to throw off this disease is as sensible as would be the conduct of a gardener who allowed weeds to grow in his garden while experimenting with substances to render the soil inimical to them. The gardens worked on this plan would make a sad showing alongside those in the hands of practical men, who destroyed the invaders at their first appearance.

It is probable that the human body will be kept free from the virulent weeds or animal organisms of the cancerous affections by a similar system of early eradication for years to come; and that, as our specific knowledge of its nature increases, the only hope of a broader relief from the disease lies in the line of prevention.

CHAPTER I.

THE NATURE OF MALIGNANT GROWTHS.

A malignant growth, like all true tumors, reveals on microscopic investigation a structure in which the protoplasmic bits of life known as cells are the chief feature. All tumor tissues share with the general body structures in the essential characteristic of being composed of a collection of individual cell entities, each cell being possessed of a quasi-independent existence under the general correlating government of the nervous system. Some of these cell entities of the normal body possess the power of independent locomotion even, as, for instance, the leucocytes, and in many respects resemble the single-celled animals, the *amœbæ*, which, composed only of a formless mass of nucleated protoplasm, lead an active and apparently independent existence in their normal habitat.

Special cancer cells have been described, but the most recent consensus of pathologists is to the effect that the cells of most, at least, of cancerous growths do not differ in shape from the cells of normal tissues. The principal difference is in their position with reference to the other structures or stroma when in their normal habitat, or to their being outside their normal habitat, or heterotopic. In other words, the ordinary microscopic evidence of malignancy that is most conclusive is that which shows an erosion of surrounding structures by invading cell masses in more or less excess.

The histologic characteristics of malignancy are therefore closely analogous to the clinical characteristics, and indicate that malignancy is evidenced by the excessive reproduction of cells which erode surrounding structures or organs, destroying them and replacing them with their own progeny in a mob-like aggregation. The later clinical evidences of malignancy are a natural extension of the histologic changes into macroscopic proportions, showing to the ordinary senses a progressive, usually painless, growth of the aggregation, which tends to destroy, more or less rapidly, the life of the host by the development of toxins, but also more especially by the development of intravascular thrombi which are mechanically washed to more vital organs in which they form secondary erosive growths that terminate life.

The conditions involved in these characteristics of erosion, so-called metastasis, and rapid growth, are therefore the distinguishing points between malignant and benign tumors, and constitute an illimitable chasm between them. In accordance with these facts it will invariably be found that a benign tumor possesses a capsule made up of condensed surrounding tissues or other limiting membrane, distinctly separating it from contiguous structures, and that it can only displace the latter by pressing them aside; it cannot give rise to similar tumors in the same person by autoinfection; and it is of relatively slow growth.

CLASSIFICATION.—A convenient classification for tumors, including malignant growths, has been arranged by referring all tumors into the same group which are derived from the same germinal layer of the embryo. Those cancers arising in tissues derived from the epiblast and hypoblast, the epithelial and glandular structures are therefore classed as carcinomas, while those derived from the mesoblast, the connective tissue type, are classed as sarcomas.

The following arrangement of malignant tumors has been adapted from the classifications of the most recent writers on the subject:

CLASSIFICATION OF MALIGNANT TUMORS.

<i>Histogenetic Situation</i>	<i>Group</i>	<i>Chief Varieties</i>
Epiblastic and hypoblastic tissues, producing Epithelial type.	Carcinoma	{ <ul style="list-style-type: none"> Rodent cancer (epithelioma of the short-hair follicles) Squamous-celled carcinoma Cylindrical-celled carcinoma Glandular carcinoma
Mesoblastic tissues, producing Connective-tissue type.	Sarcoma.	{ <ul style="list-style-type: none"> Round-celled sarcoma Spindle-celled sarcoma Lympho-sarcoma Myeloid sarcoma Myxoma Melano-sarcoma

To get a clear comprehension of this classification of malignant tumors it should be remembered that carcinoma is properly the name of a group, of which epithelioma, etc., are varieties; and that this group includes the only varieties to which the name "cancer" is strictly applied, the several varieties of sarcoma not being included. This restriction of the designation to carcinomas alone in exact phraseology has given rise to

the general impression among some physicians that sarcomas do not possess the same degree of virulence as carcinomas—an impression that is often greatly at variance with the facts. The truth is that this classification should convey no such impression, for it serves only for purposes of identification. The classification is, in fact, somewhat artificial, like the Linnean classification of plants by botanists, which places the potato and the deadly nightshade in the same family. The carcinoma group includes genera and species of every degree of virulence, as does also the sarcoma group. The words “cancer” and “cancerous” might well apply to the more virulent members of each group, and are so employed when speaking comprehensively of malignant affections in this work.

Carcinomas are cancers that arise primarily in situations where epithelial cells are normally found. Sarcomas are cancerous processes arising primarily in the connective tissues. The degrees of virulence of the several varieties of each group are extremely variable, and this peculiarity of a given variety has no real relation to the embryonal layer in which it has its origin. What is probably the true reason for the degree of virulence possessed by each genus will be referred to later.

One of the most important characteristics of malignant growths is the formation of daughter tumors by a process of colonization, either in contiguous or remote parts of the body, this process being accomplished by the entrance of the cells of the mother tumor into eroded lymphatics or bloodvessels and their conveyance therein to the secondary sites of growth. These daughter tumors are said to be invariably composed of cells resembling those of the mother tumor. For instance, if the primary tumor arises in the glandular cells of the breast the daughter tumor will show exactly similar cells, somewhat similarly arranged, even if situated in the liver or kidney; the cells of a tumor of the rectum will be faithfully reproduced in its daughter tumors in the spleen, etc.

Moreover, a primarily malignant tumor always grows by the reproduction of cells of its own kind, destroying neighboring tissues and organs at its periphery by an erosive process, and replacing the cells normal to the part by its own special variety. A carcinoma may therefore extend far beyond the tissues derived from the epiblastic or hypoblastic layers in which it had its origin, replacing the connective tissue cells by its own con-

quering progeny; and the same is true of a sarcoma, which, though necessarily arising in connective tissues, may invade tissues derived from any germinal layer when highly malignant.

NATURE OF THE CANCEROUS PROCESS. What, then, is the true nature of the cancerous process? The answer to this question, it is believed by the author, can be determined by the clinical evidence as necessarily parasitic; and this deduction is in a fair way to be proven by culture experiments, if not already proven. Before reciting the circumstances leading to this conclusion, it is best to briefly review the older theory of the nature of cancer, which is yet maintained by some writers on the subject.

THE AUTOCYTIC THEORY. This theory, which ascribes the cancer process to a reversion of certain cells to their primitive amebiform condition after having thrown off the control of the nervous system, is thus explained by Dr. Herbert Snow, who still adheres to it as the best working hypothesis.*

"The human body is wholly composed of cells, pure and simple; of modified cells; and of products formed within cells. Its complex machinery has been built up from a single cell as the starting point.

The ameba is a tiny animal which maintains an independent existence, and yet consists of but a solitary cell. It is composed of a jelly-like substance, entitled protoplasm, anent whose properties we practically know nothing. If we did, we should go far towards solving the mystery of life. A small portion of this protoplasm, the nucleus, is differentiated from the rest, it has higher vital and different chemical properties, and acts as a governing center to the whole. Some individuals, but not all, have a further differentiation of ecto-sarc and endo-sarc—that is, of cell-wall more compact, and of cell-contents more fluid.

The ameba exhibits on a microscopic scale all the phenomena shown by the largest member of the animal kingdom. It takes food into its substance, digests it, excretes the useless portions. It moves about by contracting and extending its body, these motions responding to excitation from without and to impulse from within. It reproduces by fissiparous division, com-

* "Cancerous and Other Tumors." By Herbert Snow, M. D. (Lond.) Baillière, Tindall & Cox, London, 1898.

mening, as a rule, in the nucleus. Lastly, it may be said to breathe, the metabolic processes which nourish it being largely processes of oxidation.

All cells are fundamentally constructed upon the same ground plan as the ameba; and all through some part of their existence are practically distinct organisms, moving in the same way, and leading a quasi-independent life. The leucocytes of the blood are from beginning to end no more than amœbæ.

The whole body is evolved from clusters of ameboid cells. many of these primordial organisms are, of course, eventually developed into the various tissues: nerve, muscle, cartilage, bone, etc.; but many never pass beyond the primary universal stage of cell-life. It is among these or their descendants that cancer arises.

Organization of the cell-clusters into formed tissue takes place under the control of the nerve centers, and by means of some regulating mechanism inherent in the latter.

Emancipation from the presiding authority of the central nervous system during the period of development involves structural aberration, such as the various deformities or 'freaks.'

Weakness or derangement of the central power, after the organism has reached maturity, results first in disordered function, *i. e.*, in ill-health; secondly, and generally after some continuance of the former stage, in organic morbid changes, *i. e.*, in disease. It is hardly too much to say that all maladies not directly induced by extraneous agency are primarily nerve derangements."

After thus reviewing the principal facts of cellular physiology, Dr. Herbert Snow continues:

"The autocytic theory ascribes cancer to a reversion of the natural cells or cell elements to that primitive amebiform condition from which all have emerged, and in which a few still persist. Each cell then casts off its allegiance to the nerve centers, which cease to exert over it the least control. It becomes a quasi-independent parasite, or rather autocyte.

The malignant or "cancer" cell now preys, exactly as a parasite would, upon the healthy parts around, devouring these, and appropriating the nutriment destined for them. Its life is not as their life, and involves sooner or later their death. Ultimately it brings about the somatic death of the whole organism.

A runaway horse furnishes an apt, if homely, exemplar of cancerous disease, as conceived by the autocytic theory.

The numerous species of cancer depend on the particular kind of cell subjected to this morbid reversion, the cancer process."

Such is a succinct statement of a "working hypothesis" of apparent importance in the elucidation of the problem of the true nature of cancer. It must be admitted that it offers a comprehensible explanation of the fact that cancer cells resemble the cells of the organ in which they primarily appear. Yet it is hard to understand how a simple release of a given group of cells from nervous control could produce the enormous change of character involved in the conversion of these useful bits of protoplasm into the microscopic ravening beasts of malignancy. Such miraculous character transformations are scientifically inconceivable, even admitting a full reversion to the amebiform independence alluded to, for the physical basis of a man's fixedness of character has been well established by biologists as an almost changeless product of hereditary traits, and what is true of the somatic individual must be an even less complicated fact of the minute protoplasmic entities of which he is composed.

If the essential elements of cancer are the cells, which resemble the normal cells at the initial point of development and are so faithfully reproduced as to character and grouping in distant colonies, there must be some profound change in their character to constitute the malignancy. Can this profound change (which may be summarized as an added power of growth and new powers to erode and colonize) be produced by a mere withdrawal from nervous influence?

THE PARASITIC THEORY. The search for a demonstrable parasite that will produce a cancer when inoculated into the bodies of the lower animals or of man is now actively under prosecution by a number of laboratory workers in America and elsewhere, and definite announcements of success have recently been made by Sanfelice, in Italy, Plimmer, in England, and Gaylord, of Buffalo, N. Y. Sanfelice announced that a blastomycetic fungus, like that of the yeast plant, is the responsible agent of the growth, while Plimmer and Gaylord believe they have isolated and cultivated a protozoon that produces cancer growths. It is probable that pathologists themselves are not yet in a position to pass judgment on any of the questions thus

propounded. Mere students of the literary contributions of these investigators are further disheartened by a very long list of similar claims by previous workers during the past twenty years, many of which failed to be corroborated. The careful observer must, therefore, still keep his judgment in suspension, even though he believes the probabilities all favor the parasitic origin of these growths.

The difficulties in the way of the investigation are indeed enormous, and almost unprecedented, in comparison with other work in the artificial cultivation of disease germs. Practically all of the recent cultivation discoveries in the elucidation of the causation of disease have been concerned with quickly-growing plant life; a few days, or at most, weeks, being sufficient for the development of the disease within the animal or in artificial cultures. In cancer, months or years are required for the development of the disease in the human body, hence an equal time may be required in artificial cultures, with methods totally different from those employed in bacteriology. If the germ belongs to the animal kingdom the example of malaria at once occurs, where no real progress was made until the extra-human portion of the life cycle of the plasmodium was made plain by the discovery of the anopheles mosquito as an essential host.

Clinical Evidences that Cancer is Due to the Invasion of an Extrinsic Germ.—The efforts of the practical physician to control malignant diseases need not, however, be arrested while the laboratory workers are yet engaged in their important researches. Certain clinical evidences point so surely to their parasitic nature that to treat them otherwise is the extreme of unwisdom. Many of the well-known infectious germ diseases have been treated for ages as parasitic on the strength of positive clinical evidences, yet their specific germs are still undiscovered. The absence, or extreme infrequency of evidences of infectiousness has been the chief bar to a recognition of the specificity of cancer, yet our recently acquired knowledge of the rôle of intermediate hosts, and of the longer life histories and special environments of protozoal organisms may easily account for this.

Some of the clinical evidences of the parasitic nature of cancer may be summarized as follows:

1. *Erosion, the chief cause of malignancy, is impossible of explanation except by the possession of a life power on the*

part of the cancer cell that is independent of that possessed by the surrounding normal cells.—Erosion means devouring, practically, when used as descriptive of the method by which a malignant growth extends at its periphery into the surrounding tissues, and this pathologic process is only found to exist in affections caused by extrinsic or parasitic germs. Benign tumors displace contiguous organs and structures by pressure, pushing aside the latter, while malignant tumors eat into and destroy them. The malignant growth represents an irrepressible conflict between a foreign and a domestic army; the triumph of the invading forces meaning the total destruction of the defenders in the vicinity of the combat and the repopulation of the contiguous territories by the invaders, with final death of the whole commonwealth by a combined process of local extension of the invasion and general political poisoning. No truce, or peaceful occupation of a province from which the inhabitants are driven, can occur, as happens in analogous manner with benign tumors, though the enemy may be locally checked and walled off, as it were, in very rare instances. An example of the latter condition is seen in the so-called stone cancers of the breast, which are the result of unusual vigor in the phagocytic connective tissue cells, whose interlacing fibrils choke the malignant cell growth. The conflict usually has but one ending, unless outside force is invoked to destroy the invaders.

2. *Malignant growths show, when classified, a division into related families, genera and species similar to those characteristic of living integers in both the animal and vegetable kingdoms.*—This classification is more significantly similar also than is usually supposed. The zoological classification of dogs and lions together and cats and tigers is paralleled by the inclusion of the spindle-celled sarcoma and melano-sarcoma in the same family; of the rodent ulcer and the quickly-growing epitheliomas; of the ordinary acinous cancer of the breast and the fulminating variety. The botanical classification of poisonous and non-poisonous plants in the same family are well-known, such as tobacco, belladonna, the potato and the tomato in the order solanacea; the edible agaricus campestris and the poisonous amanita in the sub-order of mushrooms, etc.

3. *The immutability of species is as marked a characteristic of malignant growths as in any other order of life. Like pro-*

duces like in cancers as surely as in all other living things, whether of the animal or vegetable kingdom.—The relation of parent and progeny is not only evident in the reproduction of malignant cells incident to the growth and local extension of a cancer, but, most significantly, in the resemblance between parent colony and daughter colony in the mode of extension miscalled metastasis * in which a graft from a cancer of the breast, for instance, when arrested in the capillaries of the lung, liver, or elsewhere, reproduces cells resembling the mother tumor.

But this last mentioned clinical evidence of the parasitic nature of cancer—the similarity between the cells and their arrangement in the mother tumor and daughter tumors—is, at first sight, a stumbling block to the parasitic hypothesis, for the reappearance of the special type and arrangement of the mammary cells in the daughter tumor seems to support the autocytic theory of a mere change in their character. The answer to this is that the main point, after all, is the reproduction of this special form of “changed character,” which is a far more significant phenomenon than the persistence of the histologic type. It is evident that we have two reproductions to deal with: the reproduction of the cell of the organ primarily infected, and the reproduction of the parasitic cell-inclusion, and that the latter hereditary trait is by far the most important.

It may be tentatively stated, therefore, that a cancer grows and reproduces itself by the reproduction of cells which have become changed in character by reason of the presence of parasitic germs, and that each generation of cells thus changed contains new generations of the infecting germs.

* The word colonization describes the transference of a portion of a disease to another place, without change in the original seat of the disease, better than the term metastasis, which is more strictly applied to the disappearance of a condition at one point and its reappearance at another, as in acute rheumatism.



THE EMPLOYMENT OF PHYSICAL THERAPEUTICS
BY THE GENERAL PRACTITIONER.*

BY WILLIAM BENHAM SNOW, M. D., NEW YORK.

At the present time the trend of medical thought is to specialism, and too often the specialist is not so broad-minded in his judgment of *advanced therapeutic* measures as he should be, but severely condemnatory of methods with which he is unfamiliar. This has been amply illustrated in the perfunctory way in which the dermatologist has taken up the employment of the x-ray and high potential currents in the treatment of skin diseases. To-day the general practitioner with the necessary knowledge of managing these modalities will obtain better results in the class to which they are adopted than the specialist who either ignores them or does not know how to properly employ them, the latter being too often the case. The same may be said also of the neurologist, the orthopedist, the gynecologist, or the genito-urinary specialist who does not use the high and low potential electrical currents, the x-ray, heat, cold, mechanical vibration and light, one or more of them in the treatment of his cases. The modalities, which are rapidly coming into general use and favor, have been too long ignored by the profession at large. These fields of application open up to the general practitioner opportunities whereby he can obtain in therapeutics better results, if he understands the modalities and their employment, than the specialist who ignores them. In the treatment of a very large number of conditions, the physician who is employing these agents is obtaining results that have never been obtained before.

As the practical side of therapeutics develops, it becomes more and more patent to the observing physician who employs these physical measures that the future success of the profession lies largely in their general adoption, not only for the relief of chronic diseases but for every-day employment in the lesser ailments and in acute infectious diseases as well.

Chemistry in the hands of the profession has proved too often a failure, and with advancing years the earnest, honest prac-

* Read by invitation before the Jenkins Medical Society at Yonkers on Thursday evening, November 15, 1906.

itioner becomes less and less reconciled to the general employment of the drugs of the pharmacopeia. In truth the tendency of the times is towards the abandonment of universal medication.

The present tendency in the treatment of infectious conditions is the institution and development of antitoxins, in the use of which there is great danger of going too far. The introduction of one poison into the system for the purpose of overcoming another poison is heroic, and questionable, except when heroics are indicated. From any point of view such measures are fraught with danger to the patient and should not be employed when others are as successful. The indications are better met by increasing the functional resistance or opsonic index of the organism, thereby destroying infection by the body's own internal fortifications—the phagocytes. In the physical agents there is abundant proof at this time, that we possess reliable means of overcoming many infectious conditions. In light, high temperature, cold, and various electrical and other mechanical modalities, we have most potent means for increasing the activities of the physical functions, enabling us thereby to eliminate effete products of tissue combustion, as well as effecting the destruction and elimination of organisms that would otherwise prey upon the living cells.

The first indication in the treatment of all diseased conditions, whether local or constitutional, is the induction of physical activity. The human body is constituted to require a large degree of general activity for the maintenance of health. The disposition of human nature, on the other hand, is against this requisite of health, for the human being is lazy, and if health is to be preserved or restored without exercise, some external means of inducing general activity, not normally induced by exercise, must be substituted. Besides being lazy, the human being is generally fond of good living and apt to be excessive. *Inactivity* and *gluttony* are incompatible with health and a common cause of impaired general metabolism.

It is not rational to expect to relieve such conditions with drugs. The bowels may be evacuated, but little more will be accomplished, under the circumstances. What is required in the treatment of these patients is the induction of physiological activity by the employment of energetic means which will

act upon the emunctories, forcing the performance of the functions of the body, without depressing the whole system, as is too often done by stimulants and cathartics. With medicine it may be possible to afford temporary relief; but not to cure the condition. The employment of regulated exercise and diet with light baths, high potential electricity, the administration of heat, or mechanical vibration—agents that induce active metabolism—one or more of them is indicated. These will institute a healthy régime, and without their employment complete restoration is impossible.

For relief of chronic inflammatory conditions with associated stasis, physical measures, particularly the static currents, mechanical vibration, and light are generally indicated, and in acute inflammatory conditions, when properly administered, they are a great boon to suffering humanity, because they relieve early stasis, restore circulation in the parts, institute prompt repair, and otherwise destroy the germ processes as well, either by raising the opsonic index or destroying the offenders *in situ*. So general is the requirement for these modalities in therapeutics, when understood, that the day is near when the general practitioner must employ them or his patients will unnecessarily suffer or go elsewhere for treatment.

When considering the various therapeutical modalities known as physical agents, the uses of high potential electricity, the continuous current, light, mechanical vibration, heat, cold, exercise, and diet are properly included.

Under the high potential therapeutical modalities are included the static currents, the alternating high frequency currents, derived both from static machines and coils, in connection with resonators and two other currents, though of low voltage generally, the faradic or induced and the sinusoidal currents.

It is necessary to understand, when considering the classification of electrical currents, that in each and every case it is the same electricity, only differing in the condition in which it is presented and varying in the following particulars: (1) the quantity or amperage, (2) the voltage or potential, (3) the rate and character of the interruption, and (4) in other characteristic differences depending upon the origin of a particular current, as the pulsatory practically unidirectional highly diffusive currents of the static machine differ from the oscillating,

largely alternating current from a Rhumkorff coil, or the alternating currents.

Unipolarity.—A constant continuance of one polarity at one pole without alteration is the distinctly characteristic quality of the constant current as derived from the galvanic cells and from the static machine. While these currents differ widely in potential or voltage, with them it is possible to influence or affect the tissues with either negative or positive electrons, thereby exerting their distinctive differences of effects as indicated.

We must elect therefore to employ the static or constant currents for their unipolar effects, for all other currents are more or less alternating in character.

The effects to be derived from high potential currents may be properly placed in three divisions.

I. The mechanical action, which may be considered both as of gross sensible contractions induced upon the tissues, and the finer vibratory impulses or wave currents of high frequency or high periodicity analogous to radiant energy, as of light, and the x-ray. The grosser sensible contractions are obtained only from the modalities of the static machine, the induced, sinusoidal, and interrupted galvanic currents. For the production of the electrical mechanical effects the static currents properly replace all others, for currents from no other source are so capable of diffusion nor possess the capacity for the production of painless, potent, and diffuse muscular and protoplasmic contraction, an effect which is largely due to the practically unipolar and extremely high potential characteristics of static electricity to which are due its remarkable powers of diffusion.

II. The actinic action of the high potential currents of high or other frequencies, as administered with vacuum tubes, is another property of these currents which is remarkable in influencing metabolism,—raising the opsonic index or resistance of the individual by their action upon the circulating blood, increasing the oxidizing property in the tissues, and their capacity to eliminate the products of faulty metabolism, the same effects which may be attributed to light. There is, however, an additional electrical influence when the high frequency currents are made to pass through the tissues in currents of large amperage, the volume of current tending to destroy or inhibit various germs which may be present in the tissues, as the

gonococcus or tubercle bacillus. This property, while bordering in its influence upon the next classification, simulates in many particulars the actinic effect.

III. The electrical action per se, of currents of various potentials considered from the standpoint of the latest revelations in electrical science, that electricity is not a mode of motion, as previously supposed, but a moving substance representing matter in corpuscles—a smaller divided state than the atom. Since Thomson resolved an atom of hydrogen into more than 800 corpuscles which were demonstrated to be negative electrons, and Sir Oliver Lodge has so well said “they seem to be the substance of which matter is made,” we can no longer consider them other than emanations from the electrical source.

Matter, thus divided as it passes through the tissues of the body, produces effects essentially mechanical, at the same time carrying with it the chemical properties, whether negative or positive, of the passing current. As negative electrons have been resolved from hydrogen, so may the positive electrons be derived from oxygen, two chemical opposites, the two which, combined in water, represent energy exhausted. We need, then, to realize that matter in the form of either positive or negative electrons is passed to and fro through the tissues. It has been clinically demonstrated in the administration of the static wave current and static insulation that the positive insulation with the passage to and fro in the economy almost exclusively of positive electrons have been productive of the greatest benefits in therapeutics. The positive electrons are more instrumental in inducing normal metabolism and relieving inflammatory processes than the negative electrons.

Electrolysis, a process which is inconsequential from the high potential sources as employed in therapeutics on account of their great diffusion must be considered, from the standpoint of chemical combination, as varying with the negative and positive on account of the radical difference in the characteristic constituents of the electrons.

Polarization.—Properly another electrical effect from the high potential currents of small quantity is of great importance; for all bodies like charged seek to separate from each other, inducing activity in the cells. Under the unipolar charge with interrupted periods of discharge, as with the static wave current, the cellular entities of the body will be thrown into ac-

tivity by the influence of polarization upon individual cells, thereby inducing activity in the tissues.

The continuous current, better known as the galvanic—a current of very low voltage, as used in therapeutics usually in currents not exceeding 110 volts—employs the largest amperage used in therapeutics except, possibly, the high frequency alternating current as employed in auto-condensation. On account of these characteristics the current occupies a unique field. Though still adhered to by many of the old observers, it is of relatively small utility for the relief of conditions calling for a mechanical or nutritional treatment. A current of such low voltage is not so diffusible except as it may soak into the tissues, as water does in dry earth. If the two poles are placed near each other, and a relatively large amount of current strength employed with large electrodes, the current may be localized; otherwise it will follow the track of least resistance as a turbid stream across a lowland, and not affect, as it is too often supposed to, some tissues or organs, as the spinal cord, to which it may be directed. When, however, it is desired to concentrate this current, for purposes of tissue destruction, as for the relief of menorrhagia, the destruction of neoplasms by massive doses, as employed by Massey in mercuric electrolysis for the destruction of malignant growths, for purposes of electro-cautery as well as for the removal of scar tissue in the mucous cavities the continuous current fills an important place in therapeutics.

The therapeutics of the x-ray is a subject upon which much doubt has been thrown by the expressions of surgeons and specialists whose experience with it as a therapeutic agent have been very limited, or from an entirely objecting point of view. Those who have employed the x-ray technically as it should be employed, and with a true investigating spirit as to its physical qualities and physiological actions, have not written against it, but, on the contrary, have found it an increasing number of indications which are well conserved by it. The x-ray is not, as is so often supposed by superficial observers, an agent which acts upon the tissues chemically to destroy them, producing fell destruction of tissue, but, on the contrary, it is simply an ether vibration as shown by Roentgen, Thomson, Lodge, and hosts of others in accord with the whole army of physical observers, differing only from the solar light wave in length and frequency. It has a wave length smaller than the atom and there-

fore, as predicted long before by Helmholtz, goes straight on and is not refracted as are the solar rays.

What the x-ray really accomplishes in the tissues is an inhibitory action putting to sleep, as it were, the cells either gradually or profoundly, according to the intensity and duration of the exposures. The x-ray undoubtedly produces profound tissue contraction, gradually throwing the cells into a condition of inactivity which, when carried to a great degree, results in suspension of animation and tissue death,—the x-ray burn. The real effect wrought upon the tissues of therapeutic value depends upon the relative resistance of the normal tissues and the adventitious tissues, neoplasm, fungi, or germs present in it and acted upon. The tissue or entity of the greatest resistance will longest withstand irradiation, and the induction of an early or late dermatitis will depend upon the resistance of individual tissues. It is this principle which chiefly governs its employment in therapeutics. The success or failure of its employment, then, depends upon whether the irradiations are used with sufficient energy to destroy the tissue or organism in question, or whether the normal tissue yields first. Under x-ray exposure the skin becomes atrophied, the hair follicles and sweat glands inert, the arterioles contracted, and the circulation of the blood diminished. Under such conditions it becomes an untenable abiding-place for some forms of life that under normal conditions exist upon it. That, however, is not the most likely reason of its efficacy in destroying these organisms, as farther experiments have disclosed that one of the most potent influences is the inhibition of the procreative function in most, if not all, forms of life. The investigations of Drs. Tilden Brown and Ogden found almost without exception that operators who had employed the x-ray with large ampere currents and without protection for a considerable time were sterile. The experiments of Dr. Edward Titus went still farther and demonstrated that eggs and seeds of plants exposed for about twenty minutes to the x-ray were rendered unproductive, while controls were demonstrated to be fertile. Dr. Titus showed further the opposite effects of light, by exposing an equal number of seeds and eggs that had been previously exposed to the x-ray, to light, demonstrating by his experiment that the germinating function was thereby revived.

The results of stopping the process in the treatment of carbuncles, lupus vulgaris, tinea tonsurans, sycosis, acne vulgaris, tubercular glands, pulmonary tuberculosis and numerous other conditions associated with the presence of germs or fungi suggest the probability that in all cases the procreative function of the forms of life may be inhibited or destroyed by the Roentgen ray.

It has been found clinically that the normal tissue elements in most cases outlive or resist to a greater degree exposures to the x-ray than the forms of life or lowly vitalized tissue present in it. It is also well demonstrated that, after the suspension of the x-ray exposures, at least following the first two series of irradiations, the tissues will recover, to the fullest degree, their normal tone and resistance. With these facts demonstrated, the field of operation becomes a perfectly clear and rational one and explains satisfactorily the wonderful clinical results obtained in the hands of skilled physicians. The x-ray looked at from this point of view and employed in repeated small doses, and with sufficient energy to produce x-ray dermatitis in from ten to fifteen exposures made on alternate days, is both safe and effective. The dermatitis produced in this manner is the physiological effect of the ray and fraught with absolutely no danger to the tissues if the irradiations are promptly discontinued at this stage. The physician or surgeon who favors operation with the knife upon any malignant process without doing so in conjunction with a systematic employment of the x-ray, does not look to the best interest of his patient, and is not excusable in the light of present knowledge on any ground other than doubt or ignorance, for which there may be some excuse in the fact that he is following in the path laid out by those who have not given the subject serious consideration and conscientious trial. The use of the x-ray in an apologetic, perfunctory way, is simply the indication of want of appreciation of its capacity to sterilize living tissue and free it to a large degree from the ravages of infectious disease. These statements have been verified by the writer and a very large number of honest scientific observers.

In radiant light and heat, as clinically demonstrated first by the writer and confirmed by the experiment of Dr. Edward Titus, we have the antithesis of the x-ray in its effects upon living tissue. While in many instances capable of destroying

germ life, it accomplishes it in another way. Used in connection with the x-ray, however, it places the operator and patient in no questionable position, as they have ever at hand the means of checking any unfavorable degrees of dermatitis.

The therapeutic action of radiant light and heat, as derived from the sun, electric arc, and incandescent lamp, covers an important field in therapeutics. The actions may be divided into (1) the actinic, (2) the radiant heat effects, and (3) the metabolic influences due to the vibratory characteristics of the radiations.

The actinic effects of light derived from the combined spectrum upon the blood, are increased as the tissues become dilated, and more blood is flowing into the dilated capillaries and thereby brought under the influence of the radiations. The effect of these radiations is to increase the oxidizing influences of the blood cells and to sterilize the blood serum from many obnoxious toxins present in it, as running water is purified by the sunlight. Elimination is effected at the same time through the increased activity of the sweat glands. The tissue resistance is thereby raised with a general improvement of the processes of nutrition.

The influences of radiant heat combined with the radiations of light are likewise instrumental in lessening the activity of various germs present in the blood and tissues, at the same time increasing the activity of the phagocytes. This effect is amply illustrated in the administrations of dry hot air in the treatment of septic infection. The favorable action of radiant light and heat upon inflammatory processes, particularly in infected conditions, is undoubtedly due to the combined effects of light and heat. With the increased local hyperemia there is at least an increase in the number of the phagocytes to act upon the infectious elements present which coincidentally are rendered less active by the effects of light and heat radiations.

The energetic effects upon metabolism, together with the excretion from the skin induced by radiant light and heat, is remarkable, as shown by abundant clinical evidence. This effect is undoubtedly due to a large extent to the influences as shown above, but as well, we believe, to the fact that the radiations act as a reflex stimulus which is transmitted from the end neurons to the central nervous system. The influence upon nutritional processes of radiant light and heat, either natural or

artificial, when applied to the nude surface, is well shown in the remarkable increase in body weight in poorly nourished and anemic patients. An agent so potent in this respect fills a most valuable field in therapeutics.

Mechanotherapy, including mechanical vibration, manual massage, and the use of the machines of Zander and Taylor, in vogue on the continent of Europe, and in a few instances in this country, occupies a field generally recognized as valuable in therapeutics. The great improvement made in recent years, however, in the types of hand machines or vibrators and the adoption of scientific and rational methods of application, have, in a large measure, replaced in this country the work of the manual masseur and cumbersome machines which are so much in favor abroad.

Two principles of the utmost importance are involved in the manipulation of mechanical vibration: (1) spinal stimulation and inhibition and (2) vibra-massage. The study of spinal conditions and the resulting relief of areas of spinal tenderness and muscular contractions by the scientific applications of mechanical vibration has been a revelation to the profession, as the resulting removal of remote conditions. In therapeutics to-day no one can accomplish the best results and ignore these regions of tenderness along the vertebral column which are promptly accomplished by mechanical vibration. It is well attested by numerous observers that applications over the respective nerve roots may stimulate or inhibit the peripheral blood supply, thereby altering the metabolism through the influence of the respective end neurons.

Mechanical vibration, as manual massage, effects by peripheral stimulation the determination to a larger degree of nutrition to a part and an improved metabolism when judiciously employed, and is more thorough than the manual manipulation properly applied, and far less laborious. For relaxing contracted muscles and softening and eliminating exudations about the joints, in skilled hands it serves far better than the manual method.

The effects of high temperatures are first to produce a local hyperemia by dilatation of the capillaries and the smaller arteries, but when persistent application is made and for a long time the hyperemia is superseded by marked tissue contraction constricting the tissues and forcing out the blood supply, there-

by in immediate proximal conditions relieving local stasis and congestion as demonstrated in the successful treatment on the early stage of a felon or a commencing suppurative tonsillitis by applications of intense moist heat for from three to five hours, or, as taught by Emmet long ago in the treatment by hot douches of pelvic cellulitis. Behold the fingers of the wash-woman.

In the employment of heat, the mistake is too often made of failing to institute sufficiently high temperatures and of not maintaining it for long periods of time as for four or five hours, which is necessary to success.

The employment of heat in connection with cold applications for the purpose of influencing derivative effects is one of the most valuable of therapeutic procedures, as the employment of heat to the lower extremities and pelvic region with cold compresses applied over a congested viscus situated in the upper part of the abdominal cavity, as in acute hepatitis and conditions often present with reverse peristalsis associated with post-operative stercoraceous vomiting.

The use of dry superheated air with the body or a limb wrapped in Turkish toweling, employing a properly constructed apparatus with temperatures ranging from 250° to 450° F., is one of the most effective means of bringing about active elimination through the skin, relieving the system by these channels of various toxins and other effete materials locked up in the tissues, as in rheumatism or gout. This is accomplished both by peripheral stimulation and the reflex effect upon the deep spinal centers.

Radiant light and heat as administered in the light bath, however, serve the same purpose in these conditions with the added actinic effects.

In the treatment of *septic infection*, however, the influence of dry superheated air is well attested. It is remarkable how, with the employment of a limb apparatus, local septic infection is promptly cured; a fact which we regret to say is not generally appreciated by the profession at large. The action is due undoubtedly to the induction of profound local hyperemia, increasing the number of phagocytes in the tissues in proportion as the influx of blood is increased. At the same time the high temperature lowers the activity and resistance of the staphylococci or streptococci present. Except in far advanced cases of

local septic infection in the limbs there can be no failure to promptly relieve the condition and save the part by the employment of judicious drainage, together with a few proper administrations of dry hot air. The same is true in many cases of gangrene.

A remarkable result was obtained by the writer in a case of general septicemia following an operation for hysterectomy in which a patient in a most critical condition, with a high temperature and weak irregular heart action, was promptly relieved and restored by a body hot air administration, employing for twenty minutes a temperature of 350° F. The body temperature, 105°, was lowered to 103° during the administration and without other treatment was normal eight hours after and followed by complete restoration in ten days.

The therapeutic indication for the administration of cold at varying degrees will depend largely upon the idiosyncrasy of the individual. While every one responds normally and favorably to heat, those of lowered vitality react badly from cold. Cold may be applied over acute inflammatory conditions to subdue the process and when continued for many days may be effective in appendicitis, but in the writer's experience is not so good practice in most cases as the prolonged administration of high temperatures. Cold inhibits all activities, both of the phagocytes and pathogenic bacteria, but instantly upon its removal the reaction which occurs is certain to be followed by the re-establishment of the process with greater fury than before, because the reaction in asthenic cases is, as a rule, prompt and certain to follow where cold has been applied and must be continuous to be effective. Cold may be used, and wisely, however, for the purpose of suspending the process pending an operation and is not objectionable in this instance. The use of cold douches, plunges, and sprays for the purpose of instituting better reaction of the skin whereby the patient is less apt to feel exposures to drafts and cold, is of undoubted value as a routine practice during the life of every individual who properly reacts from the exposure, and there are few who may not acquire the necessary resistance by gradually employing lower temperatures.

The *cold wet pack* applied for inactive functions of the skin and conditions of internal congestion is remarkably efficacious in determining the blood to the periphery and relieving such.

processes. Such cold applications have not, however, to the same extent the inhibitory effects upon the infectious elements in the blood as that induced by superheated dry air, nor does it to the same degree increase the activity of the leucocytes. The therapeutic application of the spinal douche employing alternating heat and cold for reflex effects, while to a degree beneficial, does not compare in efficiency with the spinal administration of the static wave current and sparks for the relief of acute and chronic spinal cord congestions.

The vaso-motor effects of the spinal ice bag, while reflexly stimulating various therapeutic processes, is valuable only when better means are not at command. It, too, has been superseded generally by the judicious and scientific employment of mechanical vibration and high potential electrical currents by those who are familiar with their employment and effects.

Diet and exercise, measures of the utmost importance, are subjects with which the physician should be conversant. They are the most difficult measures to institute, against the lazy and gastronomic inclinations of humanity, but imperative if health is to be restored or maintained.

By well-authenticated physiological actions and the clinical results obtained, it is demonstrated that there are relatively few physical ailments that cannot be overcome and the individual restored to a condition of health while the disease is in its functional stage, before organic or destructive change or hyperplasia has intervened. This is true because inflammatory conditions call for mechanical instead of chemical intervention.

Few there are, who would disparage the judicious and restricted use of a limited number of the drugs of the pharmacopeia, and, on the other hand, no enlightened physician can afford to ignore the rational employment as indicated of the physical measures which are generally far more effective. The armamentarium of the physician may be enriched if not already supplied with a static machine, the apparatus which covers a very wide range in therapeutics, a high power incandescent lamp with a proper reflector, a mechanical vibrator, a continuous current wall plate and an apparatus for administering locally superheated dry air, all of which will have paid for themselves within six months in the hands of the established general practitioner who understands their use, and cure a large number of patients whom he cannot favorably affect by other means.

349 West 57th Street.

THE PREVENTION OF DEFORMITY AFTER INFANTILE PARALYSIS BY RECUMBENCY DURING THE STAGE OF RECESSION.

BY ADONIRAM B. JUDSON, M. D., NEW YORK.

In the ever-changing treatment of disease the influence of environment is receiving unusual attention, as is seen in the management of tuberculosis of the joints. The influence of the lapse of time is also better understood. Medicines are given in small doses for very long periods, and the effects of time on the body are more clearly seen to influence the course of disease and the action of remedies.

In the treatment of infantile paralysis I propose a method which relies exclusively on the influences of environment and the lapse of time. It is applicable only in the very early stage, before the case is likely to be seen by an orthopedic surgeon. As soon as the disease is recognized I would limit the patient to the recumbent position till there is no possibility of further recession of the paralysis. The period of spontaneous recession extends over several months. During this time the difficult task must be undertaken of keeping a child, well in every other way, off his feet at an age when he should be learning to walk. In some cases eighteen months should be occupied in this way. The common belief that such a patient requires exercise, especially of the affected limbs, will give rise to criticism and objections. A simple argument will not prevail in the family circle, and the physician's word will hardly prevent the little patient from having many a romp. And when the case ends there will be differences of opinion. If some lameness results, it may be said that the patient should have had more exercise, and if there is no disability at all, after the strict observance of recumbency, it may be said that there had been very little the matter with the child.

The argument is as follows: It will be recalled that the ill effects of joint disease are seen more commonly in the lower extremities than the upper because tuberculous action is subject to resolution in the epiphyses of the shoulder, elbow, and wrist, but often goes on to destruction of the articulating surfaces of the hip, knee, and ankle. And when it is noted that the arms are free while the legs bear the weight of the body it is reasonably inferred that the joints of the lower extremities, when affected, or even suspected, should be protected by either

recumbency or appropriate apparatus. The conclusion is a plain proposition and needs no discussion or verification. It shares the simplicity of Jenner's argument when he traced the relation of cause and effect and prescribed vaccination. In another field, Finlay, walking with his eyes open, apprehended the relation of cause and effect and prescribed the sequestration of the mosquito.

The necessity of reforming the environment of the lower extremities having been derived from clinical observations of joint disease, can practical conclusions be drawn in a similar manner from observing the course of infantile paralysis? Disability from this disease is seen eight times as often in the lower as in the upper extremities, and yet in the early stage the paralysis is found in all parts of the motor nervous system. The muscles of the recumbent patient are in very moderate use and in a position entirely favorable to spontaneous recession of the paralysis. The arms and hands retain this advantage when the patient is erect, but the impaired muscles in the legs and feet give way at once when they meet the resistance of the weight of the body. They rapidly become elongated and attenuated, and could not well be placed in an attitude more destructive of the possibility of restoration.

When prescribed recumbency shall give to all parts the same environment, recession of paralysis will be equally encouraged in the lower and upper limbs, the disproportion of eight to one will be lessened, and the sum of deformity from this disease will be materially reduced.

The value of the method is thus proved, but it is not readily demonstrated. When comparing methods it is not easy to show that one is better than another. It may always be said that a case cited in behalf of a certain method may have been one that would have done well under any treatment. Tables of carefully recorded cases might lead to correct estimates, but studies of this kind are difficult and have not escaped criticism. Dr. Gaillard Thomas said with wit and wisdom that "if there is anything more misleading than facts it is figures." Medicine and surgery are still outside of the realm of exact science. Therefore we welcome every logical and reasonable resource of prevention and treatment.

As a large part of the lameness seen on the street is caused by infantile paralysis, an advance of some value in preventive medicine will be made if this method is successful in practice.

Passive motion, resistance exercises, electricity, massage, local applications, and judicious medication should be continued. They cannot interfere with the treatment proposed, and their observance may make it easier persistently to maintain recumbency, the most important agent of all.

53 Washington Square.

Editorial.

THERAPEUTIC NARROWNESS.

IT is a matter, at this time, calling for serious consideration by all who wish to be considered fair-minded members of the medical profession, that so many who are entirely ignorant of certain methods, or others who allow prejudice to bias their minds, oppose progress in methods outside their own line of investigation in medical practice. No truly great man is ever narrow; narrowness is a sure index of a small mind; and the more bitterly an individual opposes progress the stronger the evidence of his own ignorance and the fear that it will be exposed.

There is no class of medical workers who feel more strongly the justice of the above statements than those who are interested in the promulgation and institution of *advanced therapeutic* measures. While at the present time a reaction is evidenced by a degree of lessened opposition, the result of honest scientific demonstrations, there is still in many localities a remarkable degree of bitterness and cynicism against progress in this direction. Some of those who oppose and object to recognize the employment of electricity in therapeutics have been led to do so from having undertaken to derive results from that valuable therapeutic agent, and have gone about the use of it with an absolute ignorance of the effects of the measure they employed, making use of unscientific technique which has either been unfruitful of results or, even worse, has seriously injured one or more of their patients.

We are told that throughout the West and South there are hundreds of static machines standing idle, when, as a matter of fact, there are many conditions arising in the daily practice of most of the men who own them which would derive greater benefit from their employment than from the drugs they do employ, of the action of which they know little more, but use because their ignorance will not be as apparent and because we are still living in the age of almost universal medication.

The evidence of this professional narrowness is found on every hand, when those who presume to advocate in the pres-

ence of the average assembly of medical men, the employment of physical therapeutic measures.

Those referred to, who have received a lesson from their improper use, and are afraid of them, condemn them; those who know nothing about their effects condemn them for the reason that if their value is demonstrated they must perforce adopt them, and still others condemn them because, if the claims of those who employ them are substantiated, it will supplant very much of the work in other departments, particularly the work of the surgeons, who invariably derive greater financial return from an equal expenditure of skill than the workers in any other field of the profession.

There is still another reason which has prejudiced the mind of some fair-minded physicians who might be led to investigate—the claims of those employing the advanced measures seem too extravagant to be realized. In this connection it must be admitted that the results obtained by skilled clinicians with physical agents are often startling when compared with the experience derived from drug medication. This must be said in justification of the seemingly impossible results obtained when judged from the point of view of the physician who relies largely upon drug medication. On the other hand, it must be admitted that in many cases men *have* made unreasonable claims based upon experiences in single cases which have justly prejudiced the professional mind.

No better example of bigotry is to be found than the objections made to the use of the x-ray by the surgeons and dermatologists, most of whom have had very little experience with this agent, and, judging from their point of view and prejudiced expressions, it is self-evident that their objections indicate motives which, at best, are not humanitarian.

The time has come when the objectors must soon relent or be in the unenviable position of the old foggy element, which ever stands in the path of progress. The names enrolled in the lists of the coming Congress of Physiotherapy, to be held in Rome, are a guarantee that the scientific minds of the medical profession have grasped the great truth.

A physical body subject to physical laws, when suffering impairment, must look to physical vibratory energy and forces of no uncertain character to re-establish normal processes. The surgeon maims sometimes wisely, but often in a meddlesome

way, while the drug therapist experiments, applying his art in a most uncertain way, a way and method fast falling into disrepute; while the physician who employs material physical agents in accord with natural law removes obstacles which are otherwise insurmountable and restores normal processes to a degree which cannot be appreciated, except by those who, from familiarity and scientific employment of these laws and principles, effect unprecedented results, and with a uniformity that is incredible to the uninformed.

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II. CONGRÈS INTERNATIONAL DE PHYSIO- THÉRAPIE.

EXCEPTIONAL TRAVELING FACILITIES.

At the meeting of the Congress, which will be held at Rome, October 13 to 16, 1907, the Italian Minister of Public Works has kindly accorded to the members of the Congress exceptional traveling facilities on all railways of the state, as well in the peninsula as the islands.

The organizing committee of the Congress is authorized to deliver to each honorary or associate member regularly inscribed, a booklet of coupons. Each coupon gives the right to make a trip at a reduction of 40 to 60 per cent. The booklet is composed of twenty coupons. There will, therefore, be twenty trips at reduced tariff that the members of the Congress may take from one end of Italy to the other, and in the Islands. These exceptional facilities have been accorded, in view of the importance of this congress, which will assemble at Rome, Italy.

But what determined the Italian government to deliver the booklet of coupons, was the intention of offering to the members of the Congress, especially to strangers, the means of visiting, at small expense, the cities and other places of interest in Italy which present especial interest on account of their natural advantages; that is to say, the places, climates on the seashore, or in the mountains, principal watering places, and thermal stations. The limit of this book of coupons is forty-five days, from October 1 to November 15, 1907. The ladies regularly inscribed as associated members and exhibitors will be permitted to travel on the aforesaid conditions.

Merchandise intended for the exposition will have the right of transportation at half tariff, both ways. Steps have been taken with the different governments of Europe and America to obtain traveling facilities in their territory by rail or by water.

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THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

The time for the annual meeting, as previously announced, is September 17, 18, and 19, and arrangements have been made by the council and local committee, which promise to make this a banner year. This, however, cannot be accomplished, unless the committee has the support of the Fellows of the Association.

At the last council meeting, held in June, the following were elected to membership: Drs. Pitts E. Howes, Boston, Mass.; Richard J. Thompson, Fall River, Mass.; Percy H. Brigham, Boston, Mass.; Edwin A. Leavitt, Worcester, Mass.; William T. Patch, Boston, Mass., proposed by Dr. F. H. Morse; Harlo A. Fiske, Springfield, Mass.; Francis H. Humphris, Honolulu; Edward S. Smith, Bridgeport, Conn., proposed by Dr. Snow; Isaiah G. Anthoine, Nashua, N. H., proposed by Dr. McFee; Frederic C. Hutton, Philadelphia, Pa., proposed by Dr. Brockbank; Charles I. McElroy, Mt. Sterling, Ala.; F. L. Cato, Seattle, Wash., proposed by Dr. Geysen.

If Fellows who owe a recognized obligation to the Association will use their endeavor in behalf of the organization by contributing to the next session a paper giving the results of personal experience, it will add valuable information, and thereby enrich the literature. It is desirable, also, that each Fellow should induce some physician, in good standing, to become a member, thereby adding to the influence and usefulness of the Association.

Preliminary Programme.

The following subjects for papers have been forwarded to the Secretary:

Electricity a Rational Curative Factor. William A. Wattson, M. D., New York.

A Historical Sketch of Physio-Therapy. H. H. Roberts, M. D., Lexington, Ky.

Light—More Light. A. W. Herzog, M. D., New York.

Electric Light Baths in Nervous Diseases. T. D. Crothers, M. D., Hartford, Conn.

Electrical Treatment of Chronic Prostatitis and Enlarged Prostate Gland. H. E. Pitcher, M. D., Haverhill, Mass.

Limitations of Electrical Treatment in Malignant Tumors. R. Reyburn, M. D., Washington, D. C.

Roentgen Dermatitis: Its Prevention and Treatment. M. Kassabian, M. D., Philadelphia, Pa.

Report of 150 Cases of Tuberculosis. J. D. Gibson, M. D., Denver, Colo.

Physiological Laws Relating to the Effects of Physical Measures, as Employed in Therapeutics. William Benham Snow, M. D., New York.

Presentation of a Case of Lupus, Showing the Effects of Treatment by Concentrated White Light. Felix Barrett, M. D., Westbrook, Mass.

Electricity in the Diseases of the Eye, Ear, Nose, and Throat. S. J. Harris, M. D., Boston, Mass.

Arthritis Deformans. T. H. Cannon, M. D., Baltimore, Md.

A New Method for the Treatment of Pulmonary Tuberculosis. F. F. Strong, M. D., Boston, Mass.

Lupus of the Nose Requiring Three Years' Treatment with the X-Ray, Finally Cured. C. M. Steele, M. D., Oshkosh, Wis.

Physio-Therapy in its Relation to the General Practice of Medicine. Otto Jeuttner, M. D., Cincinnati, Ohio.

The Production of Sterility by the X-ray. F. B. Granger, M. D., Boston Mass.

A. C. GEYSER,
Secretary.

Progress in Physical Therapeutics.

GYNECOLOGY AND ELECTRO-CHEMICAL SURGERY.

EDITED BY G. BETTON MASSEY, M. D.

Copper Ions in the Treatment of Suppurating Sinuses and Infected Wounds.

Under the heading of "A Neglected Electric Modality," Dr. L. E. Whitney, of Carthage, Mo., contributes to the pages of the Medical Forum an appeal for a wider use of the constant current in minor electro-chemical surgery. Dr. Whitney relates two cases as follows:

Case I.—A middle-aged, rather fleshy farmer, requested treatment for suppurating sinus that had remained after an appendectomy. For nearly two years, notwithstanding daily irrigations of peroxide, bichloride, carbolic, or pix solutions, frequent curetting and constant packings with antiseptic gauze, it had persistently refused to heal, and yielded daily an ounce or more of pus.

An uncovered copper wire electrode of the caliber of a No. 16 F. sound, insulated for four or five inches at the base, was introduced to the bottom of the canal, a distance of eight and a half inches, and from twenty-five to forty ma. positive, was given for twenty minutes. This was followed by a close packing of iodoform gauze, and repeated every day. From the first treatment there was a marked change in the character and quantity of pus, and after the tenth treatment he returned with the dressings perfectly dry, and showed no response to the peroxide test.

After as many more treatments, given at longer intervals with progressively smaller electrodes, the smallest one at hand—about the size of an ordinary silver probe—failed to find any opening, and his troubles were at an end.

Case II.—A young man who had lost the first joint of his thumb, while presumably being chased by representatives of the law, presented himself a week later with the stump in a gangrenous condition.

After cleansing it, a cup electrode was fashioned of thin sheet copper to fit over the stump, and for fifteen minutes, while the patient was dancing a large and assorted variety of jigs, a current of fifteen ma. was passed through it.

Upon removal of the electrode, the offending surface was found perfectly odorless, and as green as a June lawn. A dry antiseptic dressing was applied and the patient instructed to return for a second application in two days. He did not present himself for four days, but at that time, upon removal

of the dressings, the wound was found in such ideal condition that it was simply redressed, and without further treatment the healing was rapid and complete.

Dr. Whitney's two cases are excellent illustrations of two phases of this important and much neglected subject. The first case shows what a valuable assistant minor ionic surgery would be to surgeons in general if they but knew of it. Many hundreds of such patients as this first case are to-day suffering needlessly from suppurating sinuses after various operations, their cases discrediting surgeon after surgeon, any one of whom could secure prompt healing by a resort to these methods, even though small spiculæ of dead bone or an infected ligature be at the bottom of the wound, for these latter may often be aseptized and loosened by the process, to be finally expelled spontaneously. The editor would even leave out the foul-smelling iodoform gauze as unnecessary, particularly if the copper electrode were coated with mercury before insertion, thus adding the mercury ions to the effectiveness of the process.

Technically, the only criticism of this case properly apparent to the editor is the possibly unnecessary strength of the current, even when applied to a considerable area of active electrode surface within the sinus. Ten or 15 ma. for fifteen minutes every other day might have been just as efficient, with less risk of undue action at any one point of contact.

The second case points a somewhat different moral. That this stump was not amputated promptly by the knife, under aseptic precautions, is to be regretted. Ionic surgery will not be advanced among intelligent surgeons by its publication, though the surrounding circumstances probably fully justified the doctor in the course he pursued. It shows, at any rate, what can be done by truly antiseptic surgery if the aseptic variety is not available.

[G. B. M.]

CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL.

EDITED BY WALTER H. WHITE, M. D.

The Physiological Effects of High Frequency Currents in Disease. By Samuel Sloan, M. D., F. F. P. S. G., *Journal of Electrology and Radiology*, April and May, 1907.

The writer begins his discussion with a reference to the his-

tory and disappointments which followed the published reports of D'Arsonval, based upon his laboratory experiments, in which we were told "that by the use of these currents, the blood pressure fell and then rose, remaining at a high level; that the amount of urea was increased; the quantity of urine became greater; the relation of the purin basis to the urea more nearly approached the normal where the relation had been abnormal; that the amount of the exhaled carbonic acid was higher; that the muscular system was invigorated, etc." These deductions gave a great impetus or boom to the therapeutics of these currents. The results obtained were followed by disappointments, until it was doubtful that they were capable of doing anything. Some wonderful cures were effected in which drugs and other measures had failed, "and the conclusion seemed justified, that after all there was something in it, if only this something could be gotten out of it." This was the position that Dr. Sloan held after two years of experience with high frequency currents, whereupon he began a scientific investigation of the physiological effects, he said, not in health, but in disease, and when too, they induce therapeutic effects, and when pathological, "now do they act not only on the same patient or in the same disease, but in the same disease and the same patient in the different conditions of that patient?"

The question to be solved is, "Why are such gratifying results obtained in some cases, and why are the results so disappointing in others? Let us simply continue to labor and to wait." He then states that his researches seemed to justify him in looking towards the future of electro-therapeutics with more confidence than ever, and with the conviction that we are on the fringe of great possibilities. In the early part of his investigations the conditions and results were rather discouraging and contradictory, and the ultimate results indicate a few only of the physiological effects which, in his experience, have resulted from these currents in disease. The writer deplors the fact that in the past there has been too little of exact science in the practice of electro-therapeutics, and urges that the profession employ more energy in evolving a more accurate standard of electro-therapeutics. "In one point the unqualified and legally qualified practitioners are alike, and in the present state of electro-therapeutics this is pardonable, nay, it is necessary. Both are and must be empirics in the proper and original meaning of the term; both find, by experience, that electricity, in certain forms, cures or ameliorates certain diseases or disorders, neither can say exactly how. Of how many of our drugs may this not be said? We, however, must not remain content with this. We must find out, if possible, why the same treatment sometimes does good, sometimes harm, sometimes neither the one or the other, where circumstances are apparently similar."



He then considers the action from his investigations upon different structures and parts of the organism, physical and physiological.

The Cardio-Vascular System.—The subject of blood pressure has occupied much time and attention of medical scientists during recent years. Little has been contributed, however, to the subject of published detail or organized research from the point of view of electro-therapy as apart from electro-physiology. The writer has been impressed from research with the almost universal dread, expressed or implied, of high blood pressure. "It has seemed to be a bogey of many, only a few writers having mentioned the importance in having in certain cases high blood pressure." He quotes one writer who says, "I do not think the high blood pressure in itself a good thing, but prefer to see it in subjects of nephritis." The moderately high blood pressure may mean deficient cardiac force.

He calls attention to the fact that "blood pressure is a product of peripheral resistance and systolic force, with a given peripheral resistance, the greater the systolic force, the higher the blood pressure. The "reduced blood pressure may mean either the reduction of the resistance or diminution of the force." "The danger in cases of high blood pressure—relative to the age of the individual—is not in the pressure *per se*, but in the cause of this high pressure and the fact that there is apt to be some weak point in the arterioles, notably in the brain, when a sudden increase of the *vis a tergo* will determine a fatal result." On the other hand, "the decrease in the blood pressure due to diminished systolic force might quite readily cause death as sure by heart failure, especially, as will be shown, might happen after influenza." "High frequency currents are, therefore, not unmixed good, because they are said to cause a fall in blood pressure, any more than we can consider a rise in blood pressure, which they are said to cause, sometimes, necessarily, an advantage; since these rises might be due to increase of resistance only. It will be shown, however, that there is a reason to dispute the statement that these currents do always after the therapeutic dose cause the blood pressure to fall, as they frequently, indeed, do the reverse and with much advantage to the patient, hence the importance of studying their physiological effects in disease. For comparing blood pressures he considers the Hill & Barnard's pocket sphygmomanometer as unreliable, and, on the other hand, cordially recommends the Riva-Rocci sphygmomanometer, as modified by Martin. It is a systolic pressure instrument, and can register the height of the column of mercury at the instant of cessation of the pulse in the radial artery to within 2 mm. of the correct reading, if care be taken. He states that five precautions in its use are necessary:

"1. The position of the patient and of the arm must be the same at each observation.

2. The examinations should, in each case, be made by the same person.

3. The arm band should be applied loosely.

4. Several records should be taken before the current is applied.

5. The records should be taken for each case at the same hour, if possible."

Variations are observed in the pulse rate. "Physiologists state that a fall of the blood pressure is accompanied by a quickening of the pulse;" and it should be expected in conformity with mechanical law. He finds, "however, that in disease, if this does occur, it is mainly temporary, under the influence of the high frequency currents; the cardio-vascular mechanism adjusting itself sooner or later, according, not only to the individual, but to the then condition of the individual," and, "as Haig points out, where the heart becomes seriously disabled high blood pressure causes the rapid pulse rate in proportion to the height of the peripheral resistance and the degree with which the heart is able to meet the demand upon it.

"The following table, from Waller,* bearing on the question of physiological effects of cardiac force and all peripheral resistance, will be interesting and helpful.

TABLE I

No.	Heart	Arterioles	Blood-Pressure	Blood-Flow
1.....	Force constant	Resistance increased	+	-
2.....	Force constant	Resistance diminished	-	+
3.....	Force increased	Resistance constant	+	+
4.....	Force diminished	Resistance constant	-	-
5.....	Force increased	Resistance diminished	+ -	+ +
6.....	Force diminished	Resistance increased	- +	- -
7.....	Force increased	Resistance increased	+ +	+ -
8.....	Force diminished	Resistance diminished	- -	- +

In the Waller table no mention is made on the effects of pulse rate and the writer has not been able to find any information on this subject from text-books. Then follows a series of equations with which he undertakes to elucidate some of the effects of blood pressure. These, he claims, are reasonable reductions from his charts. He states that all possible combinations of increase of cardiac force and decrease of resistance result in an increase of blood flow.

* "Human Physiology," 3d edition, page 59

Let X equal Unit increase of cardiac force.

Let Y equal Unit decrease of resistance.

Then the immediate effects of high frequency currents are:
 x plus y equals change of blood pressure 0; change of pulse rate p.

2x plus y equals change of blood pressure +; change of pulse rate—or 0.

x plus 2y equals change of blood pressure —; change of pulse rate + or 0.

According to tone of cardiac innervation.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

Radium and Its Medical Uses. By George H. Graham, M. D.,
 Archives of the Roentgen Ray, July, 1907.

The following abstract is of a paper delivered at the Medical Graduates' College and Polyclinic on March 5, 1907. The writer pays tribute to the "brilliant researches of Mme. and the late M. Curie, following the discovery of the radio-activity of uranium by Becquerel in 1896, by which we have been placed in possession of a new element—radium of surpassing interest to the physicist from the many complex and surprising phenomena it exhibits, and to us as medical men as a therapeutic agent of the greatest value.

"Radium is one of the class of substances that are radio-active, so-called from the power they possess of spontaneously emitting radiations capable of penetrating plates of metal and other objects opaque to ordinary light. These radiations have the further characteristic properties of (1) acting on a photographic plate, (2) discharging electrified bodies of ionization, and (3) causing certain substances to fluoresce. It was this power of radio-activity which led to the discovery of radium by Mme. Curie."

He calls attention to the process by which radium is obtained from pitchblende by an elaborate and expensive process. Though pitchblende is present in many parts of the world, that "coming from Johanngeorgenstadt, in Saxony, or Joachimsthal, in Bohemia, contains the largest percentage of radium, from which it is only possible to extract a few milligrammes of a pure salt from two tons."

"When a salt of radium is first prepared, it has only about one-quarter the radio-active value it ultimately attains. The maximum value is reached in about three to four weeks, and is then constant.

"Pure radium salts are at first colorless." If, however, not entirely freed from barium, it quickly acquires a yellow or orange color. In the Bunsen flame it burns with a beautiful carmine color indicating its purity. A green color within the flame indicates that it has not been freed from the barium.

Certain peculiarities of radium have been demonstrated by Mme. Curie and others. The atomic weight is 225. It maintains generally 3° to 5° above surrounding temperature, "the heat evolved amounting to 100 calories per gram per hour—sufficient to raise a weight of water equal to that of the radium from the freezing point to the boiling point every hour."

The period of average life of the radium is nearly 2000 years. It is "estimated that one-thousand-millionth part, or 1 milligramme of radium."

"Radium gives off three kinds of rays and a gas spoken of as an emanation. The rays are distinguished as Alpha, Beta, and Gamma rays, and are respectively characterized as being easily absorbed, penetrating, and very penetrating.

"The Alpha rays have a mass of 1.6, hydrogen being 1. They may be compared to the canal rays of Goldstein, and are positively charged particles, traveling at the speed of 20,000 miles per second. To Professor J. J. Thomson, of Cambridge, is due the credit of demonstrating this positive charge.

"The Beta rays are more deviable, and in a magnetic field of the above intensity would probably describe a circle having a radius of only 1-10 millimeter. They are analogous in all respects save that of speed with the cathode rays in an x-ray tube, the β rays having a mass one thousand times less than that of hydrogen. They are negatively charged particles, moving with a speed varying from 0.2 to 0.96 of the velocity of light, traveling much more rapidly than the cathode rays, thus being able to penetrate much greater thicknesses of matter before they are absorbed. Owing to their larger mass, the α rays have an immensely greater ionizing action than the β particles, but the α rays are so quickly absorbed by the air that their action ceases abruptly at a distance of 7 centimeters from the surface of the radium.

"The Gamma rays are believed to be electro-magnetic pulses or waves, similar to, but far more penetrating than x-ray, proceeding from a high vacuum tube. Their ionizing action is small when compared with that of the β rays. On the other hand, while the α rays have little action on a photographic plate, the β and γ rays have a very powerful one. No deviation of the γ rays takes place in a magnetic field. These penetrating γ rays give rise to secondary rays, having an intense action on a photographic plate, thus causing radium radio-graphs to lack the sharpness of outline of an x-ray skiagram. The absorption of all three types of rays is approximately proportional to the density of the substances traversed.

"The emanation of radium is a radio-active heavy gas, which is given off when radium is heated or dissolved in water. The volume of pure emanation emitted from radium is infinitesimal. Strutt estimates that 50 milligrammes of radium would give a volume of emanation at any one time not exceeding a large pin's head. It is an extremely active gas in consequence of its radio-activity and its great diffusibility. Experiments point to the emanation being about ninety times as dense as hydrogen, or more than six times as dense as air. It has all the peculiarities of radium in respect to ionization and photographic action, but emits only α rays. It can be condensed by cooling in liquid air. It has its uses in therapeutics, as I shall presently show, but its activity is transitory, decaying to half value in 3.7 days. It has the power of exciting radio-activity in bodies in its proximity, this "induced" activity in bodies being due to invisible and unweighable deposit of radio-active matter on the surface of these bodies. The "induced" radio-activity, which emits chiefly the β and γ rays with a few α rays, comes down to half value in twenty-eight minutes, and is lost altogether in a few hours.

"One of the peculiar properties possessed by radium is that of exciting fluorescence and phosphorescence in various bodies, such as zinc sulphide, barium platinocyanide, diamonds, willemite (green), kunzite (red), spartaite (orange). Rubies and sapphires do not fluoresce under radium. Diamonds, after prolonged exposure, become affected throughout their whole mass chiefly by the more penetrating β and γ rays, and they undergo a change of color, becoming strongly radio-active, and remaining so even for thirty-five days, notwithstanding prolonged and intense heating.

"The chemical actions of the α and β rays are many and varied. Oxygen is changed into ozone by the energy of the radiations, and white phosphorus is changed into the red variety. Mercury is said to be changed into the yellow oxide. I have converted the perchloride of mercury into calomel. A solution of iodoform in chloroform is turned purple after an exposure of a few minutes on account of the liberation of iodine by the β rays.

"Hardy made some experiments on the action of radium on globulin coagulation. Two solutions of globulin from ox serum, one made electro-positive by the addition of acetic acid, and the other electro-negative by adding ammonia, were exposed to the action of radium. A drop of the positive solution became clearer, showing more complete solution, whereas the negative drop rapidly became jelly and opaque, this action being due to the rays alone. A singular change takes place in glass and quartz vessels containing radium, depending upon the degree of activity of the radium. Glass, even when free from lead, changes color from violet through yellow to black.

"After such an application nothing visible occurs until after the eighth to fourteenth day, when a small red blush is noticed, which quickly gets deeper in color. In some cases, as in fair, clear skins, and particularly if there has been any previous treatment, such as an application of ultra violet light, the reaction may commence as early as the third day; on the other hand, if there is any obstruction to the rays reaching the skin, the reaction may be long delayed. In July last I carried an ebonite box containing five milligrammes of radium in my trousers pocket in a purse with about an inch in thickness of various coins between it and my skin. After using it I replaced it in my purse and forgot it until the third day, when I removed it. Nearly six weeks afterwards I developed a small red irritable spot on the thigh, the mark of which is still very evident."

"On the physiological action of radium, omitting for the moment that on cell life and the skin, to which I shall allude later, several remarkable observations have been made. M. Danysz, in studying its action on the nervous system, irradiated the spinal column of mice, causing death in acute nervous disturbance in from three to eight days. The young mice died sooner, showing injection of the spinal cord and meninges, and abundant meningeal hemorrhages. In a dog that had been trephined the application of radium to the brain substance caused hemiplegia after a few hours.

"Its action on the virus of rabies is specially notable. Tizzoni and Bongiovanni have shown that after radium irradiation the spinal cord of an animal that died of rabies will not inoculate other animals, but will act as a vaccine. Further, an animal inoculated with rabies and showing symptoms of the disease may be cured by a prolonged radium radiation of the cerebro-spinal axis. Sirnov, who has confined these experiments, states that the action is due to the α and β rays. On the other hand, other observers, as Castellane, Ivo Novi, and Danysz, have not been able to produce all the results claimed by the Italians. Phisalix, in experimenting with different venoms, found that snake poisons of an albuminoid nature lose their toxicity under the influence of the radiations or the emanations, but that alkaloid venoms, such as that of the salamander, are not affected.

"When buying a specimen of radium you may be told that it has an activity of 1,000,000, or 1,800,000, which means that the salt is that number of times more active than a similar weight of uranium which is taken as unity. The activity is measured by electrical methods, depending on the ionization of the air.

"For therapeutic purposes radium is usually enclosed either in a small capsule of thin glass, or in a little ebonite box with a metal cover, having a mica window in the center. The glass

capsules are liable to explode violently with the passage of an electric spark from the accumulation of a positive charge. This may be prevented by fusing a platinum wire into the glass. After such an explosion Piffard localized the lost radium in the carpet where it had fallen, by its action on a photographic plate. He then cut out the piece of carpet and sent it to a laboratory, where a good part of the radium was recovered.

"The emanation of radium may be made use of in various ways, either in its natural state, or by the induced or imparted activity of other substances, as water, cotton, wool, gelatine, bismuth, or vaseline.

"It is essential to distinguish between the *potential* activity of a given specimen of radium and its *efficacious* activity. For instance, if we take 5 milligrammes of radium bromide, having an activity of 1,000,000 uranies, the 'potential' activity for that weight of 5 milligrammes will be 5000 times that of a gramme of uranium, while its 'effective' activity, if inclosed in a capsule of aluminum, one-tenth meter thick, would be only 500 times that of a gramme of uranium. It is evident, therefore, that the essence of the therapeutic dosage of radium is time, or the duration of exposures to the rays."

"It is a problem of the highest interest, but as yet unsolved, as to what is taking place in the tissues during the latent period. The same latency occurs in the reaction following prolonged x-ray exposure. It is held by many that the first action is a constrictive one on the capillaries and small blood vessels. . . . The secondary action, or reaction, is an inflammatory one, with stimulation of cell activity and phagocytosis, accompanied by the usual phenomena of redness, heat, swelling, and irritability, rather than pain. A fine vesication occurs early in the reaction, forming later on, a thin crust, which soon peels off. The acute reaction subsides in a few days, or it may last from seven to ten days. If the reaction has been slight, only some redness and pigmentation remain, which disappear gradually; occasionally, however, taking some months to do so completely. Should the exposure have been prolonged, the whole skin may be destroyed and slough, leaving an ulcer, which, as in the case of a severe x-ray burn, may give much trouble to heal.

"The rays of radium are destructive to all cells, but primarily so to young, newly-formed, and forming cells, such as are found in inflammatory and morbid tissues. It is fortunate that this is so, as the whole of a diseased area may be cleared up without leaving the slightest sign of scarring in the healthy tissues."

In deep-seated cancer radium has not had the success it was hoped and anticipated, although Wickman has shown that the pathological tissue of cancer absorbs the rays most energetically.

cally. No authentic case of cure has, up to the present time, been reported, as far as I am aware, notwithstanding the large numbers of workers in the field.

"Many observations have been reported showing shrinking of growths, relief of pain, stoppage of hemorrhage, and the healing of ulcerated surfaces. Max Einhorn and Braunstein report the destruction of cancerous tissues in cases of constricted esophagus or rectum, thus re-establishing the caliber and allowing food and feces to pass. Various methods of application have been employed. Some have simply applied a glass tube of radium in an incision made in the center of the growth. Piffard, in this way, has inserted needles coated with radium varnish. Braunstein injected water, rendered radio-active by the emanation into the growth. In one case, where he had injected radio-active water the whole tumor liquefied and became fluctuating, without any alteration of the skin, and when evacuated the liquor was found to be yellow, transparent, and quite sterile. To produce a really tangible result it is, in my opinion, necessary to attack the growth over the whole of its growing surface at one time by rendering the healthy tissues surrounding it radio-active, thus acting alike on the blood supply and on the invading diseased cells. But here lies the difficulty, for, owing to the rapid diffusion, it is impossible to localize the action of the emanation, which is alone possible to be used. We can, however, work hand in hand with the surgeon, and I believe (though I have not tried it personally) it would tend to better and more permanent results if the surgeon, after complete removal, were to wash the wound with radio-active water, and to dust it with an antiseptic radio-active powder.

"Among those reporting treatment of cases of deep cancer are Wickman, Schiff, Abbe, and others. The latter has also reported two cases of apparent cure of sarcoma—one a giant-celled sarcoma of the lower jaw, and the other a round-celled sarcoma of the eyelid.

"In this country Mackenzie Davidson was, I believe, the first to cure a case of rodent ulcer with radium."

"Radium has acted beneficially in some affections of the nervous system. Darier reports relief, and in some cases complete cure, of cases of facial paralysis. Raymond and Zimmern report the diminution, and sometimes the disappearance of lightning pains in tabetics; while Rheus, on the other hand, has found sensation return to anesthetic patches in tabetics and lepers. Oudin quotes a case of chronic pruritus ani cured, after two sittings of ten minutes each, at intervals of ten days; and Wickman gives details of the entire relief of a case of intense cutaneous hyperæsthesia following an attack of zona in the cervical region by repeated applications of ten minutes' duration.

"In lupus vulgaris, a number of observers have reported most favorably on its action. Either alone, or in combination with Finsen treatment, I have used it in many cases with satisfaction; and it is especially useful in treating the disease of the nose, mouth, or other places where the light cannot be applied. When combined with Finsen treatment I generally treat the outlying nodules—the "satellites" of Hutchinson—with radium alone. With larger surfaces I have not found the skin after the radium treatment has been left so soft and pliable as after Finsen treatment.

"Naevi, of the capillary variety, from those the size of a small point with radiating vessels, up to large port wine stains, are very amenable to applications of radium."

"In this country, Dr. Hartigan has shown, at the Dermatological Society of London, two cases of Paget's disease of the nipple cured by the use of radium.

"I have used it successfully in eczema. Rheus, Salmon, Wickman, and others report highly of its use in psoriasis, chiefly of the guttate type. Fortunately, in the treatment of these affections it is only necessary to give exposures of from one to five minutes' duration on each place, so that fairly large surfaces can be treated in a reasonable time. In a recent case I sent a gentleman suffering from eczema to bed an hour earlier than usual for a couple of nights, and was able to treat a large surface with a happy result.

"Rheus records the disappearance, after two sittings, of patches of chronic leucoplaxia of the tongue, a disease which is usually considered as a pre-cancerous condition.

"Secondary and tertiary syphilitic lesions of the skin have been successfully treated. My friend, Mr. Deane Butcher, has treated three cases of hard chancre apparently with beneficial results. One of these was a chancre of the lip, another of the face, and a third on the prepuce. The primary sores, especially that on the lip, were accompanied by a good deal of glandular swelling. This was speedily reduced, and in each case the induration rapidly cleared up, and the sore quickly healed.

"Cohn first reported the cure of trachoma with radium, and his observations have been followed by Telenowski and others with varying, but on the whole, generally successful results."

"Its action in conjunctivitis, in uveitis, and central ulcer of the cornea," has been favorably reported on by different observers, as also the relief of pain in rheumatic ophthalmia, and choroiditis with orbital neuralgia.

"Within the last few months Drs. Oudin and Verchere, in an interesting paper read before the Academy of Sciences in Paris, have shown the use of radium in gynecological practice. The cases treated included two patients suffering from uterine fibroids, accompanied by severe hemorrhages, which had been almost continuous for many months before treatment, together

with pain and serous discharges between the hemorrhages. All the symptoms were quickly controlled by three or four irradiations. The periods became normal, metrorrhagia ceased, as also did the pain and the serous discharge and the fibroids lessened in size. Other cases were treated of gonorrheal urethritis, metritis, and extensive erosion and eversion of the cervix. In order to utilize all the three types of rays, they have since made an instrument coated with varnish for special use in such cases, or in those of gleet, prostatitis, and enlarged prostate gland. It takes about three centigrammes of the salt to cover the metal part.

"Let me say just a few words on the comparison between radium and the x-rays. Radium has been called the pocket edition of x-rays. This is only partially true; for, although there is a general similarity in the nature of the cases suitable for treatment and in their effects and results, radium has some advantages peculiarly its own.

"The combination of rays given by radium cannot be obtained from an x-ray tube, and the advantage of this combination is well shown in those cases of rodent ulcer which have not yielded to the x-rays, but have afterwards healed with radium. The energy emitted by radium when it has attained its maximum state is constant, whereas, that given by an x-ray tube is ever varying.

"In addition the α rays of radium are believed to be bactericidal, while the x-rays are not so. Radium has further advantages over the x-rays in its greater applicability, especially to internal regions and cavities, and its portability.

"In conclusion, I would say that, with a few notable exceptions, the chief therapeutic work with radium has been carried out on the continent and in the United States of America. It seems to me to be a matter of regret that in England greater use has not been made of a powerful agent possessing such undoubted value in many diseases."

This valuable contribution has been given almost in extenso. The Editor would only take exception to the views expressed concerning the relative action of the x-rays, which are much the same. Particularly the bactericidal action of the x-rays, which has been too often demonstrated. [Editor].

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Favorable Influence of X-Rays in Chronic Bronchial Affections. By Schilling, in *Munchener medizinische Wochenschrift*.

Schilling had occasion to examine a patient with a severe

bronchial asthma and used the x-ray to determine the condition of the pulmonary organs. The patient found that his asthmatic condition was very favorably influenced by the x-ray examination. The improvement was so marked as to induce Schilling to apply the x-rays in a systematic manner in a large number of cases of bronchial asthma and chronic bronchitis. He tabulates the results as determined by the amount of sputum raised before and after treatment. One case a drop from 150 c.c. to 80 c.c. in three days after the x-ray exposure. Another patient had been coughing and expectorating for months. The day before treatment the sputum amounted to 170 c.c., the day following 140 c.c., then 110, then 50, and decreased to 40 c.c. by the sixteenth day and expectoration had ceased entirely by the end of the fifth week. In every instance the amount of sputum dropped nearly one-half after the exposure and progressively declined thereafter. Every patient was favorably influenced, and the improvement or the complete cessation of the expectoration and the asthma persisted for months. He suggests as explanation of the unmistakable and prompt benefit derived that possibly the proliferating cells of the microscopic glands in the bronchi react to the rays similarly to the effect observed in the x-ray treatment of hypertrophied prostate, lymphoma, and goiter, etc. The extreme permeability of the lungs for the x-rays aid, in the process. He used a 30 cm. inductor. The patients were seated and the exposures were made from two to four directions, and in places to get to the lungs with the least muscular resistance. Protection was used for parts not to be treated and the exposures lasted from ten to twenty minutes, the distance of tube being 15 cm. The total of the exposure was kept within the range of the maximal dose and only a single sitting was given. Schilling, however, in spite of the unmistakable relief from excessive bronchial secretions and from the tormenting asthma, reserves his opinion in regard to the therapeutic value of x-ray in the treatment of bronchial affections, until he can speak from a larger experience.

The editor can add to the experience of Schilling three or four cases of asthma in which he has seen marked benefit result from x-ray. Most of my cases, however, have been more or less complicated with tuberculosis, and the asthma has improved and has kept pace with the improvement in the tubercular condition.

Roentgen Rays and Metabolism. Munchener Medizinische Wochenschrift.

From Escherich's and Holzkecht's clinic and Roentgen laboratory the following theories are expressed. They have

been able to demonstrate that the phenomena of the splitting of lecithin as in the yolk of an egg, under the influence of the Roentgen ray, occurs likewise in the living body. They detected the product of the splitting of the lecithin—the cholin—in large proportions in the blood and organs of rabbits, long submitted to the x-rays. Further experiments with a dog and comparison with the results published from various clinics seem to show that the lecithin and allied substances are principally affected by exposure to the Roentgen rays. This is evidenced by the parallelism between the changes in the blood, “the rapid transient hyper-leucocytosis,” the anatomic changes, “the exposure of the destruction of the lymphoid tissue, which reaches its height and declines again within from twenty-four to twenty-six hours,” the appearance and rapidly vanishing cholin in the blood, and the great increase in the phosphates in the urine. The normal organism seems to react to extensive exposures to the x-rays with a moderate increase in the nitrogen eliminated, lasting for several days and principally affecting the basic nitrogen and with a rapidly appearing but very transient increase in the elimination of the phosphates followed by prolonged under-elimination.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Hydrotherapeutic Treatment of Chronic Rheumatism. By J. J. Levy, M. D., New York Medical Journal, October 13, 1906.

The writer states that he has obtained much satisfaction from the following plan of treatment. The patient is given an electric light bath at a temperature of 150° F. for twenty minutes, followed by a circular douche at 90° F. for one minute, after which is given a Scotch douche to the affected joints which is again followed by general massage, special attention being given to the affected joints or muscles. These treatments are given three times weekly.

The Scotch douche consists of an alternate application with hot and cold water, which the author chooses to call the douche of thermic contrasts. The apparatus which he employs is constructed with three tubes side by side; one for live steam, another for cold water, and the third, which gives any desired temperature, is controlled by a thermometer in a mixing chamber. He then employs the steam and cold water alternated with a Scotch douche, and by rapid transitions in the appli-

cation of live steam and cold water applied to the affected parts, the profound local effect is produced and a marked reaction is brought about. The douche is valuable in combining thermic and mechanical stimulation. The mechanical action is induced by a forcible charge of water which comes from the tubes under pressure, which may also be varied. The increased local metabolism induced by his douche tends to restore the functions of the diseased part, improving the circulation with a constant tendency to absorption of the deposits in the joints.

DIETETICS.

EDITED BY SIGISMUND COHN, M. D.

Rational Childhood Diet. By W. Capon, M. D., the New England Medical Gazette.

After the first year milk should still form the basis of the diet, and should be usually given just as it comes from the cow. Occasionally an extra percentage of cream will be necessary to avoid constipation. Often the milk will have to be diluted with barley or oatmeal water. Gruels may be added to the diet at any time after the first year. White of egg, or now and then, the whole egg or toast will aid, and after one and a half years, scraped or chopped beef or mutton, is usually well borne. The child's ability to digest starchy foods depends on the ability to chew them well. For this reason alone, it is seldom well to feed potatoes until eighteen or twenty-four months have passed. About that time, finely-cut stale bread, graham, or other unsweetened crackers, zwieback, oatmeal, or other cereal, or breakfast food, is allowable in moderate quantity. A very important part of the diet is fruit. Orange juice forms a most palatable fruit and is most easily obtained. To this may be added baked apple or stewed prunes. After three years of age, a small amount of ripe pears, strawberries, peaches, or plums, may be added. Grape fruit or ripe cherries make an acceptable change, care being taken not to feed acid fruit and milk at too close intervals. Bananas are not very suitable fruit for children or adults. The starchy food should comprise crackers, bread, rice, oatmeal, and other cereals, and up to three years of age only in small amounts. Hot bread or pastry is forbidden. After two and a half years, plain custard, a small amount of ice cream, once a week or more, rice pudding, bread pudding, will form a basis of satisfactory dessert. After three years, fish and oysters may be added to the diet. Meat should be given but once a day, and no young child should eat any ham,

bacon, sausage, pork, liver, game, dried or salted meat or fish. Thickened gravies are not advisable. Green vegetables, thoroughly cooked, are allowable. Tea, coffee, wine, beer, and cider, are forbidden.

Diabetic Foods. Journal of American Medical Association, June 29, 1907.

By the Connecticut Agricultural Experiment Station investigation has been made and report given by A. L. Winton about the composition of some of the proprietary diabetic foods on the market. Most of the preparations examined showed carbohydrates in the proportion of from 4 to 75 per cent., a large majority rising as high as 40 per cent. As the principal reason for adopting a special food in diabetes is to avoid the carbohydrates, the presence of such ingredients in the special diabetic food is incompatible with the purpose for which it is sold, and fraudulent unless its presence is noted. Cereals and leguminous seeds contain a large percentage of starch. An exception must be made in the case of the soja bean, which, when ripe, has only traces of starch. Nuts, except the chestnut, are practically free from starch. The gluten flour contains a considerable amount of carbohydrates over 10 per cent., and should be used only in very small amounts, if at all. The best flour is the casein flour, which is entirely free from carbohydrates, or vegetable flour prepared from soja beans, or the flour from almonds.

Of the bread, biscuits, rusks, etc., examined, Winton found that the lowest carbohydrates contained were the No. 1, proto puffs of the Health Food Company, of New York, with 9.86 per cent.; the potato gluten biscuit, of the Battle Creek (Mich.) Sanitarium Food Company, with 9.84 per cent., and the same firm's pure gluten biscuits, with 9.07 per cent.

Two firms—the Farwell & Rhines, and the Jireh Diabetic Food Company—manufacture foods for diabetics, which contain considerable starch, and therefore, no advantage over ordinary wheat flour. The statement of the manufacturers that some starch is necessary for diabetics, is deceiving and misleading, as this applies only to a limited class of diabetics.

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Physiologic Action of the Gastric Ferments. M. A. Cleaves, Med. Rec., June 1, 1907.

She urges a more careful study of the effects of the enzymes upon the human organism, and deplors their reckless use by

those who have little or no knowledge of their action. Careful and frequent examinations of the blood and urine are urged in all cases, and a thorough discussion of the changes in these in patients under enzyme treatment is held. The effect on the sympathetic nervous system should also be watched.

The preparations used are prepared from the fresh pancreas, and contain trypsin and amylopsin. They are used hypodermically by preference, unless there is too great a local reaction, otherwise by mouth or rectum. The pathologic condition and the condition of the kidneys determine the dose. The poisonous symptoms sometimes produced by the trypsin are controlled by the amylopsin. The lesion against the production of which especial care should be taken is nephritis. In the blood, the phenomenon of peculiar interest is the constant production of an eosinophile leucocytosis. The theory is advanced that it is due to an increased glycogen content in the tissues.

In a case of malignant disease complicated by an intestinal tuberculosis, the apparently beneficial effect after the administration of trypsin upon the tuberculous symptoms, as manifested by the lessened temperature, diminished discharge, cessation of night sweats, and disappearance of the tubercle bacilli from the stools, opens up a new field for investigation.

Opsonins and the Use of Therapeutic Vaccines in Treating General Paralysis of the Insane. John D. O'Brien, Jour. A. M. A., June 29, 1907.

Working on the theory that general paralysis is a disease due to a systemic infection with the bacillus paralyticans, has treated a small series of cases by inoculations of vaccine prepared from that bacillus. The dose of this inoculation and its frequency are governed by the behavior of the opsonic index. He describes very marked improvement in cases so treated. Notes on seven cases are presented.

Sterilized Horse Serum in Surgery. Petit Med. Rec. June 22, 1907.

Has employed the injection of sterilized horse serum in more than one hundred cases for the purpose of stimulating local phagocytosis. In cases of septic peritonitis, the gauze drains are saturated with the serum and it is also poured into the cavity through the drain. It rapidly changes a thin serous exudate into a thick creamy pus filled with polynuclears. It is said to cause suppuration to diminish rapidly and to promote granulation. It has also been used as a prophylactic in non-septic abdominal conditions. In puerperal infections, excellent results were obtained by draining the uterine cavity with gauze impregnated with the serum.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

Abstract from "Symposium on Roentgen Rays in Skin Diseases." (Continued).

All of the contributors to the "Symposium" agree that the Roentgen rays are beneficial in certain skin diseases. Some are quite enthusiastic, like Professor Bergonié, who believes that the greater part of diseases of the skin can be efficiently treated by x-rays. He thinks all diseases of the skin can be improved by this method, which does not mean that all cases are improved. Dr. August Ravogli is also very hopeful in his excellent article, although he is restricting its use to selected cases only, where the ordinary treatments have failed, like acne, sycosis, psoriasis, tinea tonsurans. If there is no beneficial result after using the ordinary remedies, he would resort to x-rays.

He obtains the best results in superficial epithelioma of the skin—he mentions a "mixed treatment," as he termed it, which would seem particularly applicable in certain skin cancers where they are obstinate in yielding to the x-rays alone. His method is to cauterize the cancer with pure formaldehyde two or three times, at intervals of two or three days, until a thick, hard, grayish eschar is formed. When the eschar begins to get loose he then applies the x-rays for a few times. The tissues repair readily, granulations form, and in many cases he obtains prompt and permanent recovery.

Dr. Leonard, of Philadelphia, says: "The sooner the fact is appreciated that this remedial agent is the most complex and yet powerful alterative and stimulant to metabolism that we possess the better will be the results obtained and the less danger will patients run from the application of it by men who are incapable of predicting the results they will produce." In many of Dr. Leonard's cases which have remained cured for from two to five years after ordinary dermic medication had failed, seemed undoubted proof of the benefit of x-ray treatment. These cases included chronic eczemas in adults and children that had been intractable for seven, ten, sixteen, and even over twenty years, that had had the benefit of most expert dermatologic treatment. In addition, acne, in various forms, sycosis barbæ, alopecia areata, and lupus vulgaris and erythematosis, have yielded permanent results.

Dr. Emil H. Grubbe, of Chicago, would discourage the use of the terms "soft" and "hard" in discussing tubes. He says: "If the x-ray is to give us definite results which can be duplicated at any time, it must be measured or controlled just as we measure or determine the dosage of a drug. In other words, x-rays must be scientifically studied if we would expect exact results." Dr. Grubbe's technique is so valuable I will give it in full: "(1) The vacuum of the tube is dependent upon the depth

or density of the tissues we wish to treat, *i. e.*, the vacuum is selected for each individual case. For the treatment of lesions, involving only the superficial skin layers, I recommend a vacuum which will back up an air-space between the prime conductors of the generator of less than one inch. For lesions of a deeper character the vacuum is raised to overcome the greater resistance of the tissues, (2) The distance of the tube from the part to be treated is dependent upon the vacuum. If the vacuum selected for a given case is low the tube can be placed quite near the parts, and if the vacuum is high the tube is placed relatively farther from the patient, my rule is as follows:

If 1-inch vacuum is selected place tube 2-3 inches from patient.

If 2-inch vacuum is selected place tube 3-4 inches from patient.

If 3-inch vacuum is selected place tube 4-5 inches from patient.

If 4-inch vacuum is selected place tube 5-6 inches from patient, etc., etc.

(3) The nature of the fluorescence of the luminous hemisphere of the tube during x-ray generation is a very important factor. I excite the tube so that the luminous hemisphere is just distinguishable, but not brilliantly fluorescent. This factor is constant. (4) The length of each treatment is dependent upon the nature of the case. In ordinary cases 8-10 minutes. In extraordinary cases 10-12 minutes is the usual time, (5) Frequency of treatments: In ordinary cases, every other day; extraordinary cases, daily." "This technique is continued until cumulative action is noticed by the development of slight dermatitis, following which no more treatments are given until the parts become normal. After subsidence of dermatitis treatments are given as before, with the exception that an extra day is allowed to intervene between each application, and so on indefinitely."

BOOK REVIEWS.

MATERIA MEDICA, THERAPEUTICS, PHARMACOLOGY AND PHARMACOGNOSY, Including Medical Pharmacy, Prescription Writing and Medical Latin. A Manual for Students and Practitioners. By WILLIAM SCHLEIF, Ph.G., M. D., Demonstrator of Medical Pharmacy in the Medical Department of the University of Pennsylvania. Series edited by BERN B. GALLAUDET, M. D., Demonstrator of Anatomy and Instructor in Surgery, College of Physicians and Surgeons, New York; Visiting Surgeon, Bellevue Hospital, New York. Third Edition, Revised and Enlarged, Lea Brothers & Co., Philadelphia and New York.

This volume is a condensed but comprehensive text and reference book on Materia Medica, Therapeutics, and their adjuncts. In addition to the way in which the subject is ordinarily treated

there are chapters on Prescription Writing, Medical Latin, Medical Pharmacy and Practical Anesthesia, Tables of Doses, of Poisons and Antidotes, Incompatibilities, and a Therapeutic Index of Diseases and Remedies and the General Index, forming a valuable volume, which covers the field of *Materia Medica* in use at the present time. The book is attractively and well-arranged for practical use. It enjoys the distinction of being concise and well-written. One criticism can be made and that is in the treatment of the subject of electricity; the writer being apparently woefully ignorant that there exists such a current as the static, which has a wider therapeutic range, particularly when considered in connection with the x-ray, than any other electrical agent. It is to be deplored that such a well-written book should neglect to mention the static current, with its twenty or thirty different modalities, which are in use at the present time by some of the most advanced thinkers in this country and abroad. Otherwise the work can be highly recommended as one worthy a place in every physician's and medical student's library.

THE ABDOMINAL AND PELVIC BRAIN WITH AUTOMATIC VISCERAL GANGLIA.

By BYRON ROBINSON, B. S., M. D., Chicago, Ill.; Author of "Practical Intestinal Surgery," "Landmarks in Gynecology," "Life-size Chart of the Sympathetic Nerve," "The Peritoneum, its Histology and Physiology," "Colpoperineorrhaphy and the Structures Involved," "The Mesogastrium," "Splanchnoptosia"; Professor of Gynecology and Abdominal Surgery in the Illinois Medical College; Consulting Surgeon to the Mary Thompson Hospital for Women and Children, and the Women's Hospital of Chicago. Published by Frank S. Betz, Hammond, Ind.

In this volume, the writer gives his views concerning the anatomy, physiology and pathology of the abdominal and pelvic brain. The abdominal brain he designates as the solar or epigastric plexus, and the pelvic brain the cervical uterine ganglia. The book is practically a treatise of the abdominal sympathetic nerves and constitutes a résumé of the views which the author has previously discussed in current medical literature for the past fifteen years. He discusses, in detail, gastro-duodenal dilatation, splanchnoptosia; its physiology, anatomy, and pathology, as well as its treatment, medical, mechanical, and surgical, are considered, with a comparison of its clinical features. Throughout the book the author has endeavored to call attention to the dominating influence of the genital viscera over the other viscera, explained by the magnetical influence over the nerve supply. The author lays stress upon the term visceral drainage, by the systematic and persistent use of which the physician can accomplish vast benefit for the patient. The volume contains a large number of drawings showing the gross and minute anatomy of the various distributions of the sympathetic nerve and its relation to the glandular and circulatory structures. The work covers a unique field, in which the author seems to have made careful investigation. Seven chap-

ters are devoted to Pathologic Physiology, including General Practus, Intestinalus, Genitalus, Abdominalus, Lymphaticus. A chapter is also devoted to the consideration of Splanchnoptosis and another of the Sympathetic Relation of the Genitalia Organs. Constipation—its Pathologic Physiology, and its treatment, by exercise and diet, and “visceral drainage,” Shock and Sudden Abdominal Condition are also considered. It is a unique work and contains much valuable information for progressive practitioners, and should receive high recommendation.

TRANSACTIONS OF THE AMERICAN CLIMATOLOGICAL ASSOCIATION for the year 1906. Volume XXII. Philadelphia. Printed for the Association 1906.

Copies of this report may be had of Dr. Guy Hinsdale, the Secretary of the American Climatological Society, Hot Springs, Va. Volumes XXI and XXII contain the complete index of all the volumes.

This volume contains articles of interest to the student of physical therapeutics, including articles on Artificial Nauheim baths, by Brown; Balneology in Relation to Renal Disease, by Chas. C. Rabsom, M. D.; The Hot Morning Bath, by Norman Bridge; Light-Radiant Energy, by W. D. Robinson; Metabolism and Climate, by Boardman Reed, and numerous other articles, referable particularly to the treatment of cardiac and lung affections. The volume contains the report of a very interesting session of the American Climatological Association.

NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

THE WAPPLER ROTARY MECHANICAL INTERRUPTER FOR X-RAY AND ALL HIGH FREQUENCY CURRENTS.

Every coil producing high tension or high frequency currents requires an interrupter.

The purpose of the interrupter is to change the current strength in the primary;—as the strength changes in the primary, so correspondingly changes the potential in the secondary. The more suddenly this change takes place in the primary, the greater is the difference of the potential in the secondary.

The size of the coil and interrupter play a very important part; a spark from a 12-inch coil operated with this mechanical interrupter, it is claimed, equals radiographic results seldom obtained with the best 15-inch coil, using the chemical interrupters.

All objectionable features heretofore existing in mechanical interrupters have been carefully eliminated. In this new interrupter an independent motor is made use of without windings upon the armature; this insures positive control of speed and certainly eliminates a previously existing defect of burning out the armature winding, there being no winding to burn out. The range of frequency is under absolute control of the oper-



ator, and may be regulated from a few hundred to many thousands per minute.

The contact surfaces are made especially large across their face and are made of a composition metal, capable of rapid heat diffusion, thereby insuring longevity.

This interrupter combines the following advantages:

- (1) It is a mechanical interrupter; no acid fumes in the room; no mercury poisoning.
- (2) It is the only interrupter giving the spark of quality.
- (3) It shortens the time of exposure and lengthens the life of the tube.
- (4) It costs very little more, in the first place, and costs nothing for maintenance.
- (5) It will work as many hours as required without heating.
- (6) Five amperes, with this interrupter, give better radiographic results than twenty amperes with chemical interrupters.
- (7) It makes less noise than most acid interrupters.
- (8) It is less liable to get out of order than other interrupters.
- (9) The high frequency discharge is twice as great with less than one-half the amperage.
- (10) It has been thoroughly tried and

tested by the makers before putting it upon the market, and is absolutely guaranteed.

The interrupter is patented and manufactured by the Wappler Electric Controller Company, 117 East Eighty-seventh Street, New York.

A NEW SPHYGMOMANOMETER.

The Riva Rocci Sphygmomanometer, modified by Dr. Henry W. Cook, of the Johns Hopkins Hospital, is an apparatus for estimating arterial blood pressure or pulse force.

A closed system of air connects a rubber bulb held by the operator, a rubber band placed around the arm or leg of patient, and a mercury manometer. By the law of gases, equal pressure is transmitted to every point throughout the air system. When the pressure is raised by the operator to such a point that the pulse of the patient distal to the constricting band is obliterated, the height of the mercury column in the



manometer is equivalent to the maximum arterial blood pressure.

Anyone at all trained in pulse palpation can make an accurate reading at the first trial. The arm-piece is placed around the patient's upper arm, midway between elbow and shoulder, and adjusted to fit. The operator with one hand, increases the pressure by squeezing the rubber bulb "A," and, with the other hand, palpates the patient's radial pulse at the wrist. When the pressure just obliterates the pulse at the wrist, the height of the mercury column is noted, and it is then allowed to drop slowly until the pulse returns.

This convenient and practical apparatus is sold for \$6.50 for hospital use and \$8.50 portable in plush case, and is manufactured by E. Machlett & Son, 143 East Twenty-third Street, New York.

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CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

BY G. BETTON MASSEY, M. D.,

Attending Surgeon, American Oncologic Hospital, Philadelphia.

CHAPTER I.

(Continued from page 400.)

The Search for Possible Cancer Germs. No "Quest of the Holy Grail" compares in altruistic value to the human race with the labors of our modern knights of the laboratory, who with unwearied patience must question all things of the earth, air, and waters beneath for the germs themselves or their possible hosts in living plants or vegetables, from contact with which susceptible persons may be infected. The old theory of the tomato having an etiologic connection with cancer is suggestive but may tentatively be dismissed as improbable. Sanfelice, of Italy, announced several years ago that he had discovered the germ in a blastomycetic fungus, that others later found in the yeast-like rust of lemons, and Gaylord still later investigated the tumors on certain cabbage roots. A fruitful field for further research is indicated in these directions, and the research should include the many forms of distorted vegetable cells found in diseased corn, rye, and the so-called cancerous tumors of trees.

Alfred Haviland, of England, has made an inquiry into the geologic surface formations of various portions of the British Isles with reference to the distribution of cancer, and has embodied the results in several works and journal articles showing that cancer is more prevalent in wooded river valleys with clay subsoil, in which the rivers occasionally overflow their banks. These conclusions have been rejected by others, who point out that the river valleys mentioned were the seat of large towns containing infirmaries and hospitals to which pa-

tients were attracted, thus artificially swelling the mortality statistics. In a more recent paper published in the Practitioner for April, 1899, a closer study of the question is made, small districts being compared with each other in which large hospitals did not exist, and the conclusion was distinctly evident that the limestone districts presented the lowest mortality from cancer, while flooded clays presented the highest.

Mode of Infection. The method by which the parasite gains entrance into the body is as dark a secret as its external habitat. That it *may* be contracted by one person from another is evidenced by several well-authenticated instances, reported by Kuhn, Hyatt, Gross, and Budd. Gnelliott has, according to Park, collected twenty-eight cases of transmission to husbands of cancer from their wives, and it is said that at least five French hospital surgeons have died from cancer—presumably acquired in the practice of their profession.

Against the theory of direct contagion may be cited the general experience of physicians and surgeons brought in contact with numberless cases of the disease, which practically negatives the possibility of this method being the usual one in which cancer is acquired.

That the parasite may gain entrance into the body through the natural channels is indicated by the greater prevalence of carcinomas at or near the natural openings, as in the lips, mouth, throat, stomach, nipples, cervix uteri, and rectum.

The effect of irritation in preparing a nidus for the parasite is generally conceded: as bad teeth or unwholesome gums, continuous cigar smoking, and the presence of scars and inflammatory irritations within the cervix uteri and rectum. On the other hand, J. M. Fadgear points out that cancer of the penis in horses occurred in geldings, not stallions; that carcinoma is rare in the udders of milch cows notwithstanding the handling and irritation these organs are subjected to in these animals; and that of thirty-one cases of carcinoma in the horse not one had the starting point in any of those parts of the animal which are specially exposed to the irritation of friction by the harness or otherwise.

The possibility of cancer parasites infecting houses and thence propagating themselves within the tissues of successive residents, somewhat as Flick has demonstrated in Philadelphia in the case of tuberculosis, has been recently pointed out by sev-

eral writers. Behla* reports seventy-three deaths from cancer in the small town of Luckau during twenty-three years, all within an area no larger than two or three city squares, as many as four deaths occurring in one house. D'Arcy Power's maps of a "cancer field" in the number of the Practitioner referred to are most suggestive, showing the grouping of the cases in the houses of a certain district in England, where the geologic conditions found by Haviland to favor cancer—a clay soil and numerous sluggish water courses—were typically present. In one of these houses three deaths from malignant disease occurred successively among persons not related, and in the paper a number of similar instances are given. The most remarkable instance is, however, the localization of a series of three cases of unrelated persons in a single room. The account given of these cases is as follows:

Miss B., aged forty-five, lived in a certain house in a suburb of London for thirteen years, and died of cancer of the stomach in 1884. Miss T., aged forty-seven, then succeeded to her place and occupied her bedroom. She had lived in the house for twenty years, and died of cancer of the liver in October, 1885. Mrs. J., aged sixty-seven, who had lived in the house for eight years, succeeded to the place and bedroom successively occupied by Miss B. and by Miss T. Mrs. J. died of cancer of the breast and uterus in 1893. Each of these patients appeared to be in perfect health until they took one another's place as housekeeper to the barmaids of the establishment in which they had lived so long a time. There was no blood relationship between them. One of the sons of the house, who is a nephew of Miss T., has a keloid which has been removed three times. No further cases of cancer had occurred in this house since the rooms have been disinfected with sulphur and the bedding burnt.

But the most apparently conclusive evidence of the possibility of the contact, or house, infection of cancer has been presented in the recently observed instances of cancer occurring as epidemics among small animals confined in cages for laboratory purposes or otherwise. Borrel, Michaelis, and Loeb have contributed observations on this point, but the most interesting recent report on the subject is that of Gaylord and Clowes† who,

* *Centralblatt für Bakteriologie*, Nos. 21 to 24, 1898.

† *Journal American Medical Association*, January 5, 1907, p. 15.

after reporting the occurrence of three similar sarcomas in rats placed in a cage in the New York State Laboratory at Buffalo from which Dr. Loeb had removed sarcomatous rats nearly two years before, the cage not having been sterilized, the rats being unrelated to Dr. Loeb's rats, and no sarcomas having been observed in one hundred rats in other cages in the laboratory under similar conditions, gives the following interesting account of an endemic of cancer in a certain cage of mice in the establishment of a dealer who had been engaged in the raising of these animals for several years in Springfield, Ohio:

"One of us visited the establishment in question June 8, 1906, in the company of Dr. Rand, of Springfield, who heard the entire statement made by Mr. Landes, the owner of the establishment and a man of intelligence. The statement which he gave us regarding the occurrence of these tumors, many of which came under our own personal observation, appeared to be perfectly logical and entirely free from discrepancies. In the course of the previous year Mr. Landes had sent this laboratory six white mice with spontaneous tumors, which proved on microscopic examination to be adenocarcinomata of the breast. They were all in females and all located on the abdominal aspect. We found on inquiry that Mr. Landes recognized the fact that the source of these tumors was one old cage, built of wood, one end of which was screened off with netting. He stated that the cage was 3 years old and that it had contained for 3 years an average of about 100 old mice. He estimated that these mice bred to such an extent that he was able to get between one and two thousand young ones out of this cage, annually.

"The history of this cage is as follows: It was built in July, 1903, at his place of business, which was then at the corner of Shafer and Columbia Streets, $2\frac{1}{2}$ miles distant from its present location. It was kept in a barn, the boards of which were poorly matched, and the place was cold and windy in winter. It remained nearly a year in this barn and contained during this period about 100 mice. During the course of the winter he found one or two mice with tumors in the cage. In April, 1904, he moved to the corner of Light and Cedar Streets, two or three squares from the first location, and the cage was kept in a large coal shed, which was warm and comfortable. It remained from April to November, 1904, in this locality and

during that period he removed from the cage 25 to 30 mice with tumors. In November, 1904, he moved to his present location, $2\frac{1}{2}$ miles distant from the first two mentioned. Before the cage was removed from Light and Cedar Streets he observed 12 mice at one time with tumors, and for the purpose of ridding himself of this unfortunate development of tumors he decided to change entirely the stock in the cage. All the mice which had occupied the cage were removed and 12 adult, healthy mice, 10 females and 2 males, were imported from Washington, D. C., and introduced into the cage, which was placed in a small, detached outhouse, at least 50 feet distant from the present location of the cage. During the course of this winter 3 or 4 tumors developed.

"Since the spring of 1905, the cage has been in a large room 30 by 50 feet in size, which was previously a dance hall, and it now stands on a table 6 to 7 feet from a window where the conditions of light and ventilation are excellent. It previously stood in a different position in the room about 20 feet from its present location. During the last year he has removed between 25 and 30 mice with tumors from the cage, several of which have been sent to us. Owing to a misunderstanding on his part he had the idea that only tumors between the front legs were what we desired, and those which appeared on the flanks or lateral aspect of the abdominal region, he killed. At the time of my visit one mouse was in the cage with 2 large tumors on the right abdominal aspect. He pointed this out as an example of the kind of tumors which he thought we did not require. He states that he has never seen a tumor on the back of any mouse. He thinks they were mostly females, and in several instances when he examined them as to their sex he found they were females. He has never seen a male with a tumor. The tumors have frequently grown to great size.

"Besides the old cage, his establishment contains 12 or 15 other cages of similar construction. One of these is 2 years old, the remainder 1 year old. They are regularly stocked from the old cage. His custom is to remove from the old cage 12 or more females with one or two bucks and place them in the new cages and allow them to remain there until each cage contains approximately 100 mice. The half and three-quarters grown offspring are removed and sold. In the cage which is now 2 years old he has during the past year observed 4 to 6

mice with tumors. So far no tumors have appeared in mice in the other cages in the establishment. He remembers having seen one or two tumor mice in some of his old cages in his previous establishments, but these cages were always stocked from the old cage already described, which seems to have been the source of all his operations, and which he referred to as his incubator. The cage was purchased by the laboratory and brought to Buffalo with the mice in it. On reaching the laboratory it was found to contain 3 mice with large tumors. The interior of the cage is dark and damp, incrustated with excreta, and presents a generally unhygienic appearance. Examination on the date of sending this manuscript for publication, August 3, shows that the cage contains 28 adult and perhaps twice as many half-grown and young mice. On the floor of the cage is the carcass of a mouse which has apparently been dead some hours, with a large tumor on the abdominal aspect. This is ulcerated and shows evidence of having been gnawed. A second mouse with a tumor the size of a large hazelnut protruding between the hind legs and evidently springing from the posterior part of the mammary tissue is also found. The skin over this tumor is adherent and the tumor is evidently far advanced.

"Briefly stated, the facts in the above case are as follows: A cage has been discovered in which upwards of 60 spontaneous tumors have occurred in the course of 3 years. The fact that the location of the cage was frequently changed, and the stock entirely renewed on at least one occasion without any permanent interference with the production of tumors, makes it apparent that the cage itself was the source of infection.

"Besides these observations which point directly to the cage as the source of infection, the endemic occurrence of cancer among mice in breeding establishments is well known and is illustrated to a remarkable degree in our own experience. For instance, from January, 1905, until the present time, this laboratory has had a standing reward of twenty-five dollars for any small animal affected with cancer. This offer, as already stated, was sent to 325 dealers in pet animals. It is possible that many of them have not appreciated the significance of the offer, or have overlooked cases of cancer in their stock, but during this period we have had constant business relations with

seven dealers in different parts of the country, from whom we have purchased large numbers of mice, and who, we feel perfectly certain, have fully appreciated the monetary value of cancer mice. From one of these dealers we have received no less than eighteen female mice with cancer of the breast; from a second dealer, five of the same nature and sex; from two other dealers, one each, and from three from whom we have had repeated shipments of mice, none whatsoever. From one of these dealers from whom we have received in the last two years not less than 1,200 normal mice, we learn that he has never, in his own stock, seen an example of cancer of the mouse, but that he was able to recognize the affection was shown by his having secured for us from another dealer a single specimen.

"These figures conclusively indicate that in certain breeding establishments cancer in white mice is endemic. The condition of affairs in the breeding establishment of a dealer in Massachusetts is interesting when compared with that of the Springfield dealer where the evidence pointed to a single cage as the source of infection. This Massachusetts dealer has shipped to us, in all, eighteen cancer mice, in lots of nine, four, and five, and it is of great interest that the tumors in all of these mice were of relatively the same size. On inquiry as to where the tumors had developed, if they could be traced to a given cage or group of cages, we were notified that the mice were scattered indiscriminately through the entire establishment. This condition of affairs was so interesting that we made a trip to Massachusetts to personally inspect the premises, whereupon it was found that this dealer, in order to combat infectious and contagious diseases had her stock distributed among a large number of small boxes. These mice were moved about from box to box and the different families were regularly subdivided and used for the purpose of forming new families. This practice is entirely different from that of the Springfield establishment and easily explains the general distribution of the tumor mice through the different breeding boxes. The fact that the tumors have developed in lots of half a dozen or more at one time and that in the various shipments to us the tumors have been of relatively the same size, suggest that small epidemics have occurred at frequent intervals. The attempt to trace the origin of the infection to any particular box in the

establishment is, of course, under the present system, impossible, and it is not improbable that this method has led to the dissemination of the contagion through a large number of the boxes.

"The foregoing observations indicate that both sarcoma in rats and carcinoma of the breast in mice must be looked on as contagious, and when considered in conjunction with the classical observations of Loeb and Borrel, in which, however, it was impossible entirely to exclude the factor of heredity, should lead us to pay more serious consideration to the interesting statistics constantly accumulating which show the probable infection of the surroundings of human cancer cases in so-called "cancer houses." It should also lead to earnest consideration of the desirability of sterilizing the dressings of cancer cases and the complete sterilization of rooms which patients have occupied, and it should, at least, to no inconsiderable extent, offset the recent statement of Hansemann, that we have no right to add to the difficulties of the cancer patient by the unnecessary suspicion that he is suffering from an infectious disease. It should tend to combat the belief among pathologists that there are no grounds for even suspecting an infectious factor in malignant tumors."

LIFE HISTORY OF A CANCEROUS GROWTH.

In spite of our still imperfect knowledge of the source, intermediate host of germ, and mode of infection of malignant diseases, we are in possession of definite facts as to the life history and clinical behavior of these affections from their inception in the human body that are very valuable in prognosis and treatment. The most important of these affirms that all malignant diseases are strictly local in their inception and not, in this stage, in any sense constitutional. Whatever the nature of the malignant growth, it is strictly limited at first to the locality in which it arises, and may in this stage be eradicated by destruction or removal of all of the infected cells. If this be neglected, impossible, or but imperfectly accomplished, the growth not only enlarges in accordance with its special character for virulence, but spreads by *local dissemination*, *regional dissemination*, and *general dissemination* until such time as the life of the human host is terminated by its encroachments.

Local Dissemination. By local dissemination is meant the migration of malignant cells into the tissues in the immediate neighborhood of the original seat of the growth. There is every reason to believe that all of the more malignant cells possess a distinct power of locomotion, equal at least to the extra-vascular motility of the leucocytes, and that the process of erosion of neighboring tissues, whether soft parts, cartilage or bone, is due to the actual burrowing power of young cells, which freely penetrate surrounding parts and there reproduce their kind by kariokinetic segmentation, the tumor itself growing partly by a coalescence of the colonies begotten by each emigrant germ-cell in its rapid proliferation, and partly by similar reproduction of the cells within the edge of the principal mass. The rapidity and virulence of this growth varies greatly with the several genera and species, and are at times controlled somewhat by the physiologic resistance (phagocytic resistance) of the tissues of the host. It results in the formation of an outlying zone of dissemination surrounding a malignant tumor, made up of distinct colonies which have planted themselves in normal tissues, which they consume and from which they drain nutriment and trophic force, and the leucocytes of an inflammatory process which the body forces always marshal more or less strongly against the diseased cells. The rapidity and extent of this local dissemination vary with the particular species of growth, great differences being found among both sarcomas and carcinomas.

Regional Dissemination. A carcinoma is disseminated beyond the immediate neighborhood of the mother tumor almost exclusively by means of the lymphatics. In the process of erosion at the primary seat of the growth the migrating cells invade the lymphatic spaces and vessels and are washed along by the current until mechanically arrested, which may occur at the valves in these vessels but necessarily so at the lymphatic glands. It has been said that the larger size of the cells in sarcoma is the reason why this mode of dissemination is mainly confined to the carcinomata. Since the lymphatic glands are the filtering points, as it were, in this system, it is within their glandular structure that the infective emboli are usually first arrested. Further migration is here stayed until sufficient erosion of the gland tissue results to permit an entrance of the cells into the distal lymphatics leading to other glands in the

chain, and it is generally not until the whole chain is affected that the migratory cells at last gain entrance into the general vascular circulation, permitting general dissemination to many organs of the body. The practical effect of regional dissemination, therefore, delays general dissemination by a most important interval, though it proves that the original focus of infection no longer contains within itself the whole number of malignant cells. An important lesson to be learned from this barrier or filter action of the lymphatic glands, and the fact that only the glands nearest the growth are first affected, is the un wisdom of removing or destroying the glands of a region in which a primary cancer exists unless they are themselves palpably affected—a mistake not infrequently made in the attempted thoroughness of modern knife operations.

The regional dissemination of a sarcoma is usually accomplished by a directly continuous, or but slightly discontinuous, growth of the tumor along the fasciæ, blood vessels, or nerve sheaths—it is a local dissemination on a large scale with a special preference in certain directions. A sarcoma may, however, be disseminated through a region by the lymphatics in the same way as a carcinoma.

General Dissemination. A malignant growth does not become constitutional in any sense until general dissemination has occurred; for so long as the migrating cells are confined to the seat first attacked, and even to the lymphatic glands of the region, the affection is a strictly local disease. When the erosive process has permitted young cells to escape into the blood current, either directly or by means of the venous terminal of the lymphatics, the cells become a portion of the circulating fluid and tend to lodge as emboli in the capillaries of various internal organs, particularly the liver, the lungs, and the red marrow of the bones, and there proliferate and produce daughter tumors in every respect like the original growth. By reason of the number of the daughter tumors thus added to the primary malignant invasion, or usually by reason of the vital character of the internal organs thus attacked, the blood becomes quickly deteriorated and the characteristic cachexia of malignant disease appears.

The appearance of this cancerous cachexia is therefore a sure sign of internal dissemination of a malignant growth, and usually presages a certain failure of any efforts yet devised to

check the course of the affection. A moderate amount of cachectic discoloration of the skin may be present in some cases while the disease is still local, nevertheless, and the disappearance of this incipient cachexia during the use of the author's method of treatment on several occasions, *pari passu* with the destruction of the malignant cells, makes it apparent that the true nature of the cachexia, in part at least, is that of an auto-intoxication from the excretions of the cancer cells.

General dissemination may occur early or late in the history of the primary growth, in accordance with the virulent characteristics of the particular species, though the proneness to early metastasis does not always correspond to the local virulence, since the most hopeless general infection may be found to exist in a case in which the primary growth has been neglected on account of its small size and slight symptoms. The diagnosis of the presence of early general dissemination, when but one or two internal metastases have occurred, is at times most difficult, and the surgeon is often compelled by the dictates of humanity to give a patient the benefit of the doubt and proceed to destroy the primary growth, only to find later the inexorable evidences of the existence of an internal graft implanted some time before the destruction of the mother tumor. Such cases remain as sad examples of the importance of the early treatment of malignant disease.

The wisdom of destroying the primary growth while in doubt as to the presence of internal metastasis, is, however, at times based on other grounds, for the clinical features that render the diagnosis difficult—the absence of pain, hemorrhage, fetor, etc., traceable to the internal growth—render the destruction of the primary tumor a valuable palliation of the last days of the patient.

CHAPTER II.

THE DIFFERENTIAL DIAGNOSIS OF MALIGNANT GROWTHS.

The differential diagnosis between benign tumors and the several varieties of malignant growths assumes added importance in view of the necessity for early treatment of the latter in accordance with the present views of their local origin. It is indeed easy for the layman to diagnose an external cancer in its last stages, but the success of any rational means of cure

is at present dependent on the recognition of the disease in a much earlier stage of its progress. The early recognition of malignant local infections is therefore one of the most pressing duties of general practitioners, for it is usually the family physician who is the first to be appealed to by the patient, and the practical usefulness of early diagnosis is greatly increased by the facility with which a small growth may be eradicated by the methods described in this work, without necessarily destroying or removing the organ in which it is situated.

With this means at hand the physician is in a position to adopt the altered aphorism, "When in doubt, destroy the growth," in all small tumors of the skin and mucous membranes and all suspicious nodules in glandular organs, for in these cases the destruction produced by the application is limited to the growth itself and its immediate peripheries, and the disturbance of the patient is no greater than would be necessary if the growth be really benign, the methods being adapted to the destruction of the latter as well. The use of cataphoric methods greatly simplifies the decision to destroy small suspicious growths, therefore, relieving the surgeon from the two-horned dilemma of leaving a small focus of malignancy to develop further, meantime possibly leading to metastasis, in order that the removal of the whole organ may be justified without doubt, on the one hand, or, on the other, of sacrificing an entire organ for what turns out to be only a benign neoplasm.

CLINICAL EVIDENCES OF MALIGNANCY AND OF THE SPECIES OF A MALIGNANT GROWTH. As has been stated, the chief clinical evidence of a neoplasm being of a cancerous nature is its tendency to indefinite increase by the erosive destruction of neighboring organs; and while the microscopic evidences of this condition, shown by the cells being misplaced, in greater abundance than normally, and unprovided with a *membrana propria*, must be regarded as the standard for the formation of an absolute diagnosis, there are many clinical evidences of great value in reaching a presumptive diagnosis, and many circumstances in which the latter alone must be depended on in the absence of a skilled microscopist and where delay would endanger the patient. The clinical evidences are in certain cases even superior to histologic evidences. In two cases under the author's observation, one of carcinoma and the other of

sarcoma, the patients ultimately died of repeated recurrences in spite of the failure of several skilled histologists to find microscopic evidences of malignancy.

Probably the most important point in the diagnosis of early malignant growths is that, contrary to the prevailing impression among the people, these growths are rarely painful in the stage in which they are most curable. This fact is one of the most fruitful causes for that fatal delay which yet paralyzes remedial effort. A slight stinging, or uncomfortable sensation, is usually the only complaint made, until, the quickly proliferating cells having finally reached sensory nerve trunks or filaments, the severe and continuous pains of advanced local disease are suffered.

The age of the patient is an important factor in reaching a presumptive diagnosis. A suspicious lump is not likely to be a cancer if the patient is under thirty years, though exceptions to this rule are occasionally met with, particularly in cases of quickly growing so-called congenital sarcoma in children. The writer has met with a large sarcoma of the orbit in an infant of six weeks and in two children of five and six years, and a very large sarcoma of the ovary in a girl of fourteen. Carcinoma is more rarely found than sarcoma in these early years, though fulminating, highly parasitic, quickly-growing acinous carcinoma of the breast may be encountered in women as young as twenty-seven to thirty, particularly as a sequel to miscarriage or normal pregnancy.

Rapidity of growth is of course a marked feature of a malignant tumor, yet this fact is at times apparently wanting in those carcinomas to which the older name of scirrhus was given, the truth being that in these cases the progress of the disease in its primary site is held in check by the physiologic resistance of the individual, which permits the phagocytic cells to develop into connective tissue fibers which intersect and compress the cancer cells, giving rise to the hardness. Metastasis is, however, an ever-present danger of these slowly growing carcinomas, as of the more cellular or encephaloid variety. The rapidity of growth of a cancer is a product, therefore, of two opposing factors: the degree of malignancy of the particular germ, and the phagocytic, deterring quality of the type of cell of the individual. A rapidly growing carcinoma must be carefully differentiated from inflammatory infection, the

latter being accompanied by much more pain, heat, and tenderness, and finally by fluctuation. It must also be differentiated from gummas, tuberculosis, actinomycosis, and chronic supuration.

A primary malignant growth is very rarely multiple, as so frequently happens in benign tumors.

The mobility and contour of a small tumor of the breast are important evidences for or against malignancy. In advanced stages the diagnosis of breast cancer is exceedingly easy, even before the appearance of pain, for in addition to the lack of tenderness, the whole breast is immovably fixed to the subglandular tissues. When it is, on the contrary, yet but a small nodule situated within a lobule of the glandular tissue it is still movable, though it does not slip so readily between the fingers as a benign, encapsulated adenoma. Even in this stage the edges are more nodulated, showing the peripheral prolongations. At a later stage the overlying skin becomes attached to a carcinoma, forming a dimple, which later alters in color and texture by an extension of the malignant process to the derm itself. From chronic lobular mastitis it is differentiated by better defined edges, and by the absence of tenderness.

The retracted nipple, when its fellow is normal, is a valuable diagnostic sign in the more advanced cases of contracting scirrhus acinous carcinoma. At times the nipple is pulled aside in the direction of the most affected lobule of the breast as well as retracted.

The principal points of clinical difference between carcinoma and sarcoma are: that carcinoma invariably arises in situations where epithelial tissues are situated, and causes regional dissemination by way of the lymphatics, while sarcoma arises invariably beneath the unchanged skin or mucous membrane where connective tissues are normally prevalent, and causes regional dissemination mainly by way of the blood vessels and cellular planes of the tissues.

The following table presents the characteristic differences between sarcoma and carcinoma in a synoptical form:

	SARCOMA.	CARCINOMA.
Origin.	Connective tissue.	Epithelium.
Composition.	Immature con. tis.	Epithelial cell, fibrous stroma.
Age.	Before middle life.	After 35.

	SARCOMA.	CARCINOMA.
Sex.	More common in men.	More common in women.
Heredity.	No influence.	May influence.
Seats.	Connective tissues.	Epithelial surfaces and glands.
Metastasis.	By blood-vessels.	By lymphatics.
Growth.	More rapid, often intermittent.	Usually slower.
Outline.	Rounder, more circumscribed.	Nodular, irregular.
Local Infiltration.	Less marked.	Widespread.
Cut section.	Convex.	Concave.
Adipose tissue.	Absent.	Usually present.
Juice.	Often absent.	Present.
Color.	Reddish grey, more translucent.	Greyish white, granular.
Melanosis.	Not uncommon.	Rare.
Ulceration.	Uncommon, superficial.	Common, deep.
Adjacent skin.	Often uninvolved.	Infiltrated.
Intercellular substance.	Always present.	Absent.
Alveolar structure.	Uncommon.	Constant.
Cells and stroma.	Intimate association.	No close connection.
Blood-vessels.	Between cells.	In stroma only.
Blood-vessel walls.	Often imperfect.	Well formed.
Lymphatics.	Absent.	Present.

Clinical Examination with Reference to Stage of Growth and Advisability of Surgical Intervention. In the practical examination of a growth palpation is of the greatest importance, as by the educated touch we may determine its limits; whether cystic or solid (transillumination being at times a valuable means of verifying fluctuation); whether pulsation is present in the growth or is communicated to it by underlying arteries (by lifting it away from the latter); the nearness of important vessels; whether the malignant process is still confined to an organ or is diffused beyond it; and, most important of all, whether the glands draining the part are enlarged or not.

The local examination should also be preceded or followed by a general examination of the patient, directed especially to determine the presence or absence of secondary growths in the chest or abdomen; the condition of the arteries and of the kidney excretion; and a blood count should be made.

The blood examination is of but little value in the earlier stages of a growth, but in the presence of metastasis the number of red blood cells is decreased, falling sometimes to 1,500,000 to the cubic millimeter, though usually not getting lower than 3,500,000. Should the hemoglobin index fall to 50 per cent. the patient is apt to be too weak for any form of operation.

The leucocytes are usually unaffected in the absence of metastasis, though when this is present they may be increased, as in any wasting disease. In carcinoma in certain situations, such as the uterus, the kidney, and particularly the pancreas and thyroid, there may be a marked increase in the leucocytes.

Microscopic Diagnosis. Although much can be learned from the clinical history and the examination of the patient, yet the very early recognition of the existence of malignant disease can be made only by means of the microscope. When the condition has advanced to the point where the diagnosis can be made by the clinician the hope of helping the patient is reduced to a minimum.

In making a diagnosis of malignancy by the microscope certain characteristics of the various growths must be taken into consideration.

As already mentioned in Chapter I., malignant tumors may be classified under two headings according to the layer of the blastoderm from which they are developed. There are the epithelial tumors, the carcinomata, and the mesoblastic or sarcomatous growths.

In the carcinomas there is a distinctly atypical arrangement of the epithelium and the connective tissue. The epithelial elements are arranged either in solid nests or masses surrounded by adult connective tissue, or else there is an abnormal arrangement of imperfect acini.

The carcinomas differ greatly in appearance according to the part of the body that they occupy. When on the surface of the body they are generally flat or slightly nodular. It is such tumors as these that frequently undergo inflammatory change and ulceration on account of their being so exposed to injury.

The growths arising from the mucous membranes are usually rather soft and present frequently a cauliflower appearance. They may also undergo inflammation, or they may appear primarily in the form of an ulcer.

When a carcinoma develops within a glandular organ of the body it generally appears as an irregular infiltrating mass, that will be hard or soft according to the amount of cellular tissue present.

(To be continued.)

ENLARGED SPLEENS TREATED BY STATIC ELECTRICITY.

BY ALICE B. CONDUCT, M. D., PUNJAB, INDIA.

Medical literature treating of enlarged spleens, and their cure, has thus far been meager. This must necessarily be the fact: (1) because extreme cases are rarely seen in Temperate Zones; (2) the necessary time to leisurely study these cases, on the ground where they are most abundant, is seldom possible in the lives of the overburdened medical profession.

There is a large field for such study on the plains of the Punjab, India. There is probably no more malaria here than in many other parts of India, but a large part of the native population are cultivators of the soil. The largest wheat fields of India are here. And of late the English Government has excavated a series of irrigation canals here, that are fed from the branches of the sacred river Ganges, which rises in the Himalayan Mountains near. The irrigation is a great boon, and greatly increases the yearly output of wheat produced, and the ability of the natives to faithfully pay taxes.

The Sutlej River that flows through these plains is a most sluggish river, and it is, no doubt, a most prolific source of the malaria-producing mosquito. In many villages near these canals, and rivers, the whole population are nightly, no doubt, exposed to the malaria-producing anopheles, for these poor people have no means of protection. In fact malaria is the bane of their lives.

The large death-rate among young children is no doubt largely due to malaria and its results.

Immunity seldom seems to be the result of the continued inoculation of the malaria parasite. But with recurrent attacks of malaria, comes the chronic state that leaves a greatly enlarged spleen, as the result. Also the cachexia peculiar to malaria patients.

There is no doubt that with each paroxysm of ague, there is for the time a greatly engorged spleen. This engorgement soon subsides in favorable cases, but when the patient is poorly fed, and at the same time is overworked (considering his bodily powers) and his attacks of malaria continue unchecked, we

have a patient who easily succumbs to the enervating effects of the malarial parasite.

We have yet to study in detail the steps of such enervation in cases when the spleen becomes so congested and enlarged as to no longer normally perform its functions. Especially is the task a difficult one, as we are at present much in the dark as to exactly what all these functions are. Therefore, I beg friendly criticism on the following statements—crude yet true, for although details as to what was the condition of the blood of these patients, what of their urine, etc., are not recorded, and not even in some cases was an opportunity given to study their daily rise of temperature as some were outdoor patients, still the results obtained were so remarkable, and the hope for future study so enticing, I beg your kindly interest, and friendly criticism of these hastily arranged notes. Most of all hoping for an interest that will encourage further information from others who may be studying this important matter.

The ordinary native of India will pay no attention to an enlarged spleen until tenderness and pain, and anemia cause so much reduction of strength that at last the patient reluctantly turns to the medical profession. When no civilized medical assistants are at hand, the *hukeen* of the jungle has a variety of methods for treatment, but palliation is all that he is able to effect.

Since beginning the use of static electricity at the Memorial Hospital at the Medical School for India's Women at Ludhiana, India, it has been my pleasure to treat 53 cases of enlarged spleens, from October 1, 1906 to April, 1907. As no mild cases think it worth while to come to a doctor, the following are only representative of what most cases were as a whole.

I would also state that most of these 53 patients were cases that had been faithfully treated by the most approved methods, where medicine and outward applications are all that are available, which is most generally the situation here in India.

Case 1.—Mam-bi-bi, a little unmarried Mohammedan girl of about ten years, with a history of having had chills and fever daily, with enlarged spleen for over a year. This spleen was exceedingly tender, and as shown by the accompanying chart, extended from under the ribs, down to 1 1-2 inches below the umbilical line. And toward the right of the median line. The

surface of the spleen under my hand, was smooth, bulging, and regular. The splenic outlines being well marked. The effect on the general health was pronounced anemia, with great prostration. She had been faithfully treated for four and one-half months at our Outdoor Department, by the usual remedies for malaria with enlarged spleen, with no results. To treat this

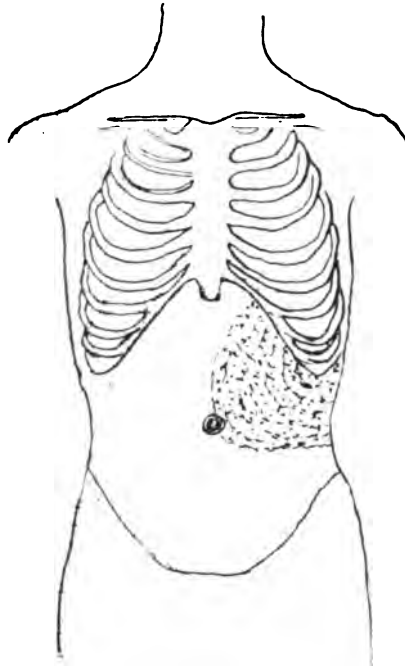


Fig. 1.—Mam bi-bi when she came under observation.

case I applied a soft metal electrode, four inches in diameter. Placing it over the splenic region, and binding it on with a wide bandage, so that it coapted closely with the surface. Then seated the patient on the insulated platform. Then connected my patient's electrode to the positive pole of the static machine, and grounded the negative pole; thus producing the Morton wave-current.

This little patient was so sensitive that at first it was not possible to employ more than an inch spark-gap, increasing the length of the gap after giving the treatment for three or four minutes. I was always able in this case to increase the

spark-gap to three inches during the twenty minutes' treatment. This treatment began October 31, 1906. The patient responded rapidly; no medicine was given, save the mixture we know as spleen mixture, which is simply light doses of ferrum carb. With this is given frequent light doses of mag. sulph. After the third treatment there were no more chills and fever. The enlarged spleen slowly decreased in size, until by December 15 the case was discharged, entirely cured. The spleen so softened in texture as to be only distinguished by percussion and only then found well up under the ribs of left side.

Case 2.—Suba, a finely-built, large-framed Hindu man of about thirty years of age, from a distant town. As this hospital

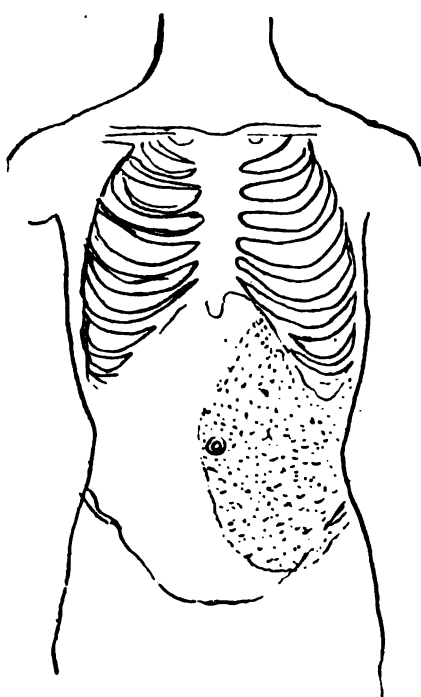


Fig. 2.—Suba's spleen when he came under observation.

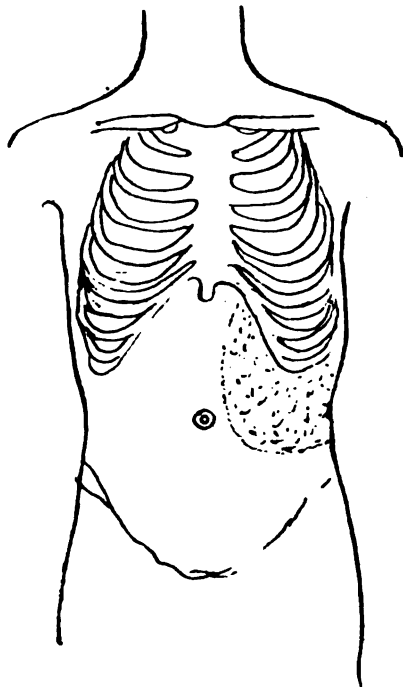


Fig. 3.—Suba's spleen when leaving our care.

is strictly a Purdah hospital (for veiled Zenana women) it is not possible to take in male patients, but this man had heard from his distant home of what we were able to do for spleens

that could not be reduced by medicine, and so he resolved to try to get the treatment as an outside patient.

This man gave a history of having had enlarged spleen for five years. He had been faithfully treated by several English surgeons and physicians during this period of five years. This was an aggravated case, as can be seen by the chart (Fig. 2). The spleen filled the whole of the left abdominal region, from under the diaphragm, to one and one-half inches below the crest of the left ilium, to across the median line, in most places one inch or one-half an inch, as shown by the chart.

The surface of this spleen under my hand was nodular, and exceedingly hard; so dense indeed as to resemble bone. The whole mass was so immovable that when the patient lay down on his back with his knees drawn up, the abdominal contents fell back into the abdominal cavity, but this spleen was so fixed, so adherent to the abdominal walls that it stood out sharply, allowing an easy mapping out of the anterior thinner border, and the sharply defined nodular anterior surface, thrown well up. There were sharp pains through the entire mass, and so much emaciation with a history of very great loss of strength. While in the past he had been able easily to carry a maund (eighty pounds), now ten pounds was too great a weight to lift.

The whole aspect of this patient induced me to decide this very probably had become a cancerous spleen. Notwithstanding my fears, however, I decided to give the Morton wave-current a trial for a few days, giving absolutely no medicines internally. What was our surprise to find the patient reporting an almost immediate relief from the sharpest of the pains, and no more fever.

After one month's treatment the spleen had reduced in size fully one-half. His strength also returned rapidly, and he declared that he was so well that a longer stay was not necessary. No amount of persuasion would induce him to remain long enough to complete the treatment, and give us the great satisfaction of making an absolute cure.

I must admit, however, that the whole aspect of this poor man had entirely changed. When he left us he had no more pain, nor tenderness over the splenic area, also the splenic texture had softened so much, that a radical change had without doubt taken place. The spleen was now quite movable

so that when the patient took the recumbent posture, the spleen did not present that sharp, hard outline, as had been the case at first. He declared himself well and strong.

Although it was a great disappointment not to be allowed to complete the cure, still the results already obtained were so pronounced, that we felt assured that a cure was possible.

It was certainly safe to say, that if such a dense immovable spleen could be reduced in size fully one-half in one month, and its adhesions entirely removed, that a still more marked change of all abnormal conditions could be expected during a second month.

Case 3.—A native woman with her nursing baby came from a distant village to get relief for an oozing hemorrhage from

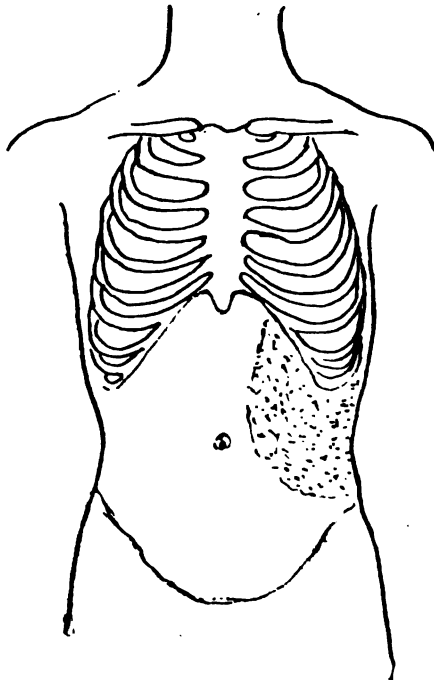


Fig. 4.—Seatai's spleen as found on coming to hospital.

her mouth. On examination it was found that her gums were exceedingly spongy, and the slightest friction, as from cleaning her teeth, caused severe hemorrhage. As most castes of India make it a practice of daily scouring their mouths with crude

charcoal (in fact it is a religious rite with most castes), this daily severe treatment of this poor woman's gums had produced often severe loss of blood. So poor Seatai had come in her bullock-cart a great distance to be healed of so distressing a malady, that prevented the daily purification by charcoal. Also her family looked upon her as unclean because of this defiling blood that so constantly poured from the poor woman's mouth.

In searching for the cause of this hemorrhage it was found that she had a very much enlarged spleen. This spleen was not as large as is often seen, therefore, she was first treated for anemic conditions, and for hemorrhage only. But as there was no result after five days she was sent to me to be treated for enlarged spleen.

Seatai was extremely anemic and daily growing weaker from this hemorrhage. I at once put her on the insulated platform to give her the Morton wave-current. What was our amusement to find that it would be necessary to allow her to hold her tiny baby while taking the electricity. So the little mother clasped her child to her heart while undergoing, to her mind, this remarkable procedure. Strange to relate, the baby sat content and quiet, the mother and child so completely formed a unit that no irritating sparks flew between them.

In this case there was no pain in the spleen, and little tenderness. This was unique, for all other enlarged spleens were both painful and tender. Was this difference due to the constant hemorrhage that depleted the spleen, and thus prevented pain? If so, why was the spleen enlarged? Also it was a remarkable fact that at present there was no fever, although a history of having suffered from both chills and fever some months previous. After the second day of treatment the hemorrhage lessened, till within a week the distressing hemorrhage had entirely ceased. Then it was only by dint of great persuasion we were able to hold the unwilling Seatai. At the end of two weeks the spleen was reduced to one-third of its former size. The patient was by this time so much stronger that she absolutely demanded her discharge papers. Such patients dictate to hospital authorities in a most autocratic manner, and we were obliged to yield, against all our ideas of correct procedure.

At the time of treating this patient I was so pressed for

time, having no assistant, that I could not take time to make a blood examination. Much to my regret, for no doubt this patient's blood would have been a veritable museum of irregularities.

The annexed chart shows at a glance what the shape and dimensions of the spleen was in this case, when she first came for treatment.

Case 4.—Paree, a Hindu woman of about thirty years of age. Came from a distant village to enter the hospital, complaining

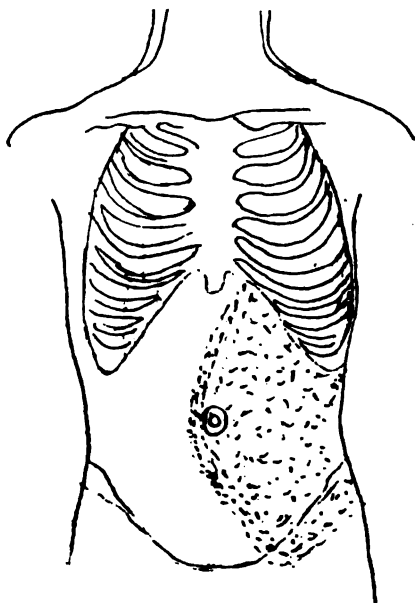


Fig. 5.—Paree's spleen as it was at the beginning of her treatment.

of severe fever and cough with much emaciation and prostration.

In this case the depression of spirit was marked. She was a tall, erect, Panjab woman, with aquiline nose, an eagle's eye, and a powerful frame. Added to this was an unusual amount of intelligence, although no education whatever. Her native ability shone out above all obstacles. One could easily imagine her the leader of all the Zenanas in her village, and no doubt her spouse was obliged to give Paree her rights, for she never betrayed any disposition to subserviency. Evi-

dently Paree held an enviable position in her own home and village, that is unusual for a woman of India.

But Paree's depression was so great that she declared she would certainly die very soon, unless these foreign doctor mem sahibs could help her. On making the physical examination, the most notable abnormality was at once found to be a very large and dense spleen, that occupied the entire left side of the abdominal space, from under the ninth rib, to fully two inches below the ant. superior spine of the ileum, to one and one-half inches past the umbilicus and median line. The liver was much enlarged and tender, extending one and one-half inches below the ribs. There was also much anemia. The lungs were not affected, although a distressing cough had so irritated the large bronchi and trachea, that a bronchitis had been developed. There was at times a low fever, but at present there were no paroxysms of ague, although there was a history of periodic attacks of fever and ague, going back for four years previous. Paree's cry, however, was not for any other distress but the cough that harassed her day and night. The cause of the cough being pressure on the phrenic nerve, in its distribution over the inferior surface of the diaphragm. We began the use of the Morton wave-current at once, over her spleen, and of all the cases treated, perhaps the most brilliant success was this one.

At the third day's treatment her cough had almost left her, and her gratitude and enthusiasm knew no bounds.

She was, as a rule, the central figure in a group of newcomers, expatiating to the open-mouthed, credulous strangers, of how utterly woe-begone and near to death she had been when she came to us, and now how rapidly she was getting rid of all her diseases.

I took good care to warn Paree repeatedly, that should she dare to leave us before we gave her our full consent, her diseases would be certain to return in full force. Thus I managed to keep this autocratic woman under treatment until some measure of results were obtained.

A most interesting item in this case was the delight she took in long spark-gaps, for most of these Indian patients are so sensitive and fearful that it is impossible to give them a really effective treatment. But Paree's spirits rose with the powerful, long sparks that made her numbers of great ear-rings that

encircled her ears jingle well. Even the bells on her toe-rings rang to the powerful vibratory impulse of the large static machine. She sat a queen on the insulated platform, in the midst of a throng of awe-stricken and wondering native women, who were sure to be on hand when Paree took her noisy bizzley (lightning); wondering most of all when she escaped alive from the jagged lightning that they saw playing between the movable static poles.

I grieve to be obliged to relate that I was this time the delinquent. Paree remained faithful, and full of enthusiasm. At the end of one month Paree's spleen had become one-half its former size, when I was taken ill with fever myself and treatment was suspended. During that one month, however, her general condition was so much improved that no cough remained, and scarce any liver enlargement. With her now hilarious spirits and bounding vitality she returned to her village home.



Editorial.

COMING MEETINGS DEVOTED TO THE SUBJECT OF PHYSICAL THERAPEUTICS.

WITHIN the next two months three important meetings will be held in the interest of physical therapeutics: (1) the meeting of the American Electro-Therapeutic Association, which will be held in Boston on the 17th, 18th, 19th of September, 1907; (2) the meeting of the American Roentgen Ray Society, which will be held in Cincinnati, Ohio, on the 2d, 3d, and 4th of October; and (3) the meeting of the II. Congrès International de Physiothérapie, which will be held in Rome on October 13-17. Except the meeting of the American Roentgen Ray Society, the subject of physical therapeutics will be considered broadly in these meetings, and there is every reason to believe from the *personnel* of the contributors—the members of these distinguished bodies—that very much will be accomplished in the furtherance of the progress and betterment of these important subjects which are now attracting the attention of the professional mind of the whole scientific world.

There has been no time in the history of therapeutics when there has been such opportunity and demand for the labors of these scientific bodies;—a time when the medical profession is so at sea and at variance with the medical practice and therapeutics of our day; when such men as Osler, Sajous, Wright, and hosts of others decry the therapeutics of drugs. It is of the utmost importance that the value of these measures which are capable of filling well the requirements where drug medication has proved unavailing in the treatment of a host of pathological conditions, which have been consequently looked upon in previous times as incurable, be established.

The significance of the employment of these methods is of the greatest import to suffering humanity, and if the profession is to pursue in honesty its calling, measures must be employed which will appeal to the intelligent mind of an intelligent public or the decadence of the profession, which has held a position so long of the highest regard and esteem, is certain. That the enlightenment which the profession requires must proceed from the members who constitute these bodies and others affiliated,

is appreciated; for the medical schools with few exceptions are making slow progress in the advancement of these subjects which must supplant the decaying therapeutics of medicine.

It is to be regretted that the other society should entirely ignore the consideration of other subjects than the use of the x-ray if it considers therapeutics at all, for while the Roentgen ray may fill a valuable place in therapeutics, it can only achieve its greatest successes by combining its use with the allied methods.

The physician who would include himself in the category of the Roentgenologist or x-ray specialist, except he make the purpose of his work diagnosis, places himself in the same narrow position as the osteopath, who expects to accomplish almost everything with one sort of therapy to the exclusion of all of the other physical or other measures.

There are probably but few of those who are enrolled as members of the American Roentgen Ray Society who would wish to be put in such a position; and yet it is a notorious fact that in its councils and discussions it has in the past generally been narrowed to the exclusion of all other subjects, excluding even light and the high-frequency currents. If for no other purpose than to control the dermatitis of the Roentgen ray, these two modalities at least, should be considered in the meetings of the Association. It is probable that in the future this society will become somewhat broader in its conception of physical therapeutics and thereby enlarge its field of usefulness in therapeutics.

* * *

MEETING OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

The next meeting of the American Electro-Therapeutic Association will be held at Copely Hall, Clarendon Street, Boston, Mass., on the 17th, 18th, and 19th of September, 1907.

Arrangements have been made to accommodate members and families and guests at the Hotel Brunswick on Copley Square, with which special rates have been made for members of the Association. The hotel is within two minutes' walk of Copley Hall, and also near the famous Public Library, Art Gallery, Trinity Church, and other points of interest. Car lines to every part of the city pass the hotel.

Arrangements have been made by the Committee for entertainments, receptions, automobile and sight-seeing trips, which in this historic city will be a great attraction to the members and their wives who attend the meeting. Efforts are being made to arrange for special rates with transportation companies of which notice will be given in the preliminary programme if effected. There will be in addition to the papers published in the accompanying programme, several others, most of which will be published in the programme which will be forwarded to the members before the time of the meeting.

Copley Hall, where the meeting will be held, has a most capacious and well-adapted assembly hall, as well as rooms for Committees, and a large room in which there will be an unusually good exhibition of therapeutic apparatus.

Every detail of arrangement is receiving most careful attention, and the meeting, in every particular, promises to be one of the best attended and most interesting in the history of the Association. Those who have not already sent in the titles of their papers should forward them to the Secretary at the earliest possible moment.

Preliminary Programme.

The following subjects for papers have been forwarded to the Secretary:

President's Address, by Morris W. Brinkmann, New York.
Electricity a Rational Curative Factor. William S. Watson, M. D., New York.

A Historical Sketch of Physio-Therapy. H. H. Roberts, M. D., Lexington, Ky.

Light—More Light. A. W. Herzog, M. D., New York.

Electric Light Baths in Nervous Diseases. T. D. Crothers, M. D., Hartford, Conn.

Electrical Treatment of Chronic Prostatitis and Enlarged Prostate Gland. H. E. Pitcher, M. D., Haverhill, Mass.

Limitations of Electrical Treatment in Malignant Tumors. R. Reyburn, M. D., Washington, D. C.

Roentgen Dermatitis: Its Prevention and Treatment. M. Kassabian, M. D., Philadelphia, Pa.

Report of 150 Cases of Tuberculosis. J. D. Gibson, M. D., Denver, Colo.

Physiological Laws Relating to the Effects of Physical Measures, as Employed in Therapeutics. William Benham Snow, M. D., New York.

Presentation of a Case of Lupus, Showing the Effects of Treatment by Concentrated White Light. Felix Barrett, M. D., Westbrook, Mass.

Electricity in the Diseases of the Eye, Ear, Nose, and Throat. S. J. Harris, M. D., Boston, Mass.

Arthritis Deformans. T. H. Cannon, M. D., Baltimore, Md.

A New Method for the Treatment of Pulmonary Tuberculosis. F. F. Strong, M. D., Boston, Mass.

Lupus of the Nose Requiring Three Years' Treatment with the X-Ray, Finally Cured. C. M. Steele, M. D., Oshkosh, Wis.

Physiological Action and Therapeutic Indication of the Constant Current. By Francis B. Bishop, M. D., Washington, D. C.

The Light Modalities in the Treatment of Disease. By Thomas W. Brockbank, Philadelphia, Pa.

Additional papers are promised of which the subjects have not been forwarded.

* * *

II. INTERNATIONAL CONGRESS OF PHYSICAL THERAPEUTICS.

The Committee of the Congress to be held in Rome next October for the consideration of Physical measures in the treatment of diseases have arranged special transit facilities for members of the Congress and their families with the following companies: Societa veneziana di navigazione a vapore, La Veloce, Lloyd Italiano, and Navigazione generale Italiano.

The last named have agreed to a reduction of 30 to 50 per cent. The advantages proffered by the other companies can be learned through any transportation company. The Committee have also concluded an especially favorable tariff for their visitors at the best hotels in Rome and other Italian cities, to which excursions will be made at very reduced rates.

The *II. Congrès International de Physiothérapie*, to be held in Rome under the patronage of the King of Italy, enrolls upon its list the names of the world's greatest contributors to the subject of physical therapeutics, including the following enrolled from Europe and America:

Committee of Organization: Prof. Guido Baccelli, *President*; *Vice-Presidents*, Prof. A. Tamburini and Prof. P. Casciani; *Secretary*, Dr. L. Cesari; *Treasurer*, Dr. L. Coleschi; *Secretary-General*, Prof. Ch. Colombo. The *Italian* members are

as follows: Hon. Prof. Santoliquido, Hon. Prof. Bianchi, Hon. Prof. De Giovanni, Prof. Fenoglio, Prof. Gabbi, Hon. Prof. Grocco, Prof. Murri, Prof. Riva, Prof. Bernabei, Prof. Capriati, Prof. Devoto, Prof. Gualdi, Dr. Luisada, Prof. Massalongo, Prof. Roth, Prof. R. Silvestrini, Dr. Vallebona, Dr. Gennari, Prof. Bozzolo, Hon. Prof. de Renzi, Dr. Ferrero di Cavellerleone, Prof. Galvagni, Hon. Prof. Maragliano, Prof. Patella, Prof. Barduzzi, Prof. Boeri, Prof. Ceccherelli, Prof. Colella, Prof. Libertini, Dr. Luraschi, Prof. Negro, Prof. Rossoni, Prof. Tanzi, Prof. Vitali, Prof. Lutario, Hon. Prof. Cardarelli, Hon. Prof. Durante, Prof. Forlanini, Prof. Giuffrè, Prof. MorSELLI, Hon. Prof. Queirolo, Prof. Belmondo, Hon. Prof. Castellino, Prof. D'Abundo, Prof. Fedili, Prof. Lucatello, Prof. Luzenberger, Dr. Quirico, Hon. Prof. Senise, Dr. Tessaro, Dr. De Lillo.

Germany: President, Very Hon. von Leydon; *Secretary*, Dr. Immelmann. *Members*: Prof. Bäumlcr, Prof. Brauer, Prof. Brieger, Prof. Curschmann, Prof. Da la Camp, Prof. Ewald, Prof. Goldscheider, Prof. Grünmach, Prof. Hoffa, Prof. Kraus, Prof. Lassar, Prof. Lichtheim, Prof. von Mehring, Prof. Moritz, Prof. Mosler, Prof. Penzoldt, Prof. Posner, Prof. von Renvers, Prof. Schultze, Prof. Schwalbe, Prof. Senator, Prof. Strümpel.

America: President, Dr. Francis B. Bishop; *Secretary*, Dr. William Benham Snow; *Treasurer*, Dr. A. C. Geyser. *Members*: Dr. F. H. Morse, Dr. M. A. Cleaves, Dr. M. L. H. Arnold Snow, Dr. W. J. Morton, Dr. M. W. Brinkmann, Dr. Curran Pope, Dr. M. H. Kassabian, Dr. G. C. Johnston, Dr. Chas. Denison, Dr. G. Betton Massey, Dr. D. E. Hoag, Dr. E. C. Titus, Dr. J. H. Kellogg, Dr. H. H. Roberts, Dr. G. F. Pfahler, Dr. J. G. Johnston, Dr. J. D. Gibson, Dr. H. F. Pitcher.

Austria: Honorary Presidents, Prof. von Noorden, Prof. Winternitz, Prof. Jaksch, Prof. Meixner, Prof. H. Lorenz, Prof. Rokitansky, Prof. Geuzinski, Prof. Jaworski. *Acting President*, Prof. A. Lorenz; *Secretary*, Dr. A. Bum. *Members*: Dr. Erben, Dr. Freund, Dr. Holzknecht, Dr. Klenböck, Dr. Marburg, Dr. Strasser, Dr. G. Pick, Drs. Mladejowsky, Spitzzy, Wittek, Wunchheim, Kowalski, Chlumsky, Buchsbaum, Hworka, Kahane, Weinberger, Slavik, Wohrizek.

Denmark: President, Israel Rosenthal; *Secretary*, Dr. Jacobaeus. *Members*: Prof. Sloman, Drs. Faber, Forchhammer, Rubow, Sardolin, Brandsled, Lorenzen, Fischer, Reyn.

France: Honorary Presidents, Profs. D'Arsonval, Bouchard, Armand Gautier, Gariel; *Acting-President*, Prof. Landouzy; *Vice-Presidents*, Profs. Bergonie, Garrigou, Grasset, Lepine, Spillman, Lemoine; *Secretaries*, Drs. Maurice Faure, Albert Weil. *Members*: Profs. Albert Robin, Arnozan, Brissaud,

Demeny, Gaucher, Gilbert, Guilloz, Imbert, Kermisson, Maygrier, Pitres, Raymond, Sigalas, Drs. Ballet, Beclere, Carron de la Carriere, Cautru, Chipault, Delherm, Desfosses, Deschamps, Duran-Fardel, Gourdon, Heitz, Huchard, Lagrange, Leredde, Lucien-Graux, Mesnard, Phillipe, Stapfer, Sollier, Tissle.

Greece: President, Prof. Savas; *Secretary*, Dr. Vassilides. *Members*: Drs. Miliaressis, Modinos, Yomoucoupoulo, Macris.

Holland: Honorary President, M. J. van Dam v. Isselt; *Acting-President*, Prof. Wenkebach; *Secretary*, Dr. van Breenen. *Members*: Profs. Ruitinga, Wertheim Solomonson, Winkler, Zwaardemaker, Drs. Tilanus, De Vries Reilingh, van Weyenburg, Bart de las Faille, C. Bollaen, Delprat, Dornseiffen, Donath, Eykmann, Essers, Haentjens, Gohl, Hartog, Hartman, Huet, Lamberts, DeLange, Meyers, Pynappel.

Hungary: Honorary Presidents Profs. V. Ketly, Dolinger, V. Koranyi, V. Herczel; *Acting-President*, Prof. Jules Donath; *Secretary*, Dr. N. Reich. *Members*: Profs. Rotr, Kuthy, Drs. Antal, Hüber, Pajor, Kopits, Jakob, Dalmady, Aranyi, Sow, Mantfeld, Batalar Widda, Schulhof, Gebhardt, Pfeifer, Renner, Szöienyi, Martinowsky.

Sweden: Presidents, Profs. Curman, G. Zander; *Secretary*, Dr. Sternbeck. *Members*: Drs. Bergquist, Haglund, Hedenius, Bagge, E. Zander, G. Forsell, L. Gasparini, V. Maragliano, Dr. Gaibiassi, Rossi.

Lombardy. Members: Drs. Ghirelli, Luraschi, P. Remartini, E. Vigano.

Sicily: Honorary Presidents, Profs. E. DeRenzi, L. Bianchi; *Acting-President*, Prof. F. Piccinino; *Vice-Presidents*, Profs. R. Colella, C. Romano, A. Curcio; *Secretary*, Dr. F. Blasi; *Treasurer*, Dr. A. Nava. *Members*: Profs. Capriati, Gallo, De Lunzenberger, Sgobbo, Oro, Libertini, Abbamonte, Maturi.

Venice: President, Prof. A. De Giovanni; *Secretary*, Dr. E. Tessaro. *Members*: Profs. Belmondo, Breda, Zaniboni, Lucatello, Messadaglia, Penzo, Spangaro, Drs. Tarugi, Spellicci.

England: President, Dr. Lewis-Jones; *Secretary*, Dr. Deane Butcher. *Members*: Drs. Chisholm Williams, Hall Edwards, Thurstan Holland, Harrison Low, Mackintyre, Reginald Morton, Harrison Orton, A. D. Ried, Sequeira, Shenton, Knowsley Sibley, Dawson Turner, Hugh Walsham.

Belgium: Honorary Presidents, Dr. Desguin, Prof. von Winiwarter; *Acting-President*, Prof. Jacques; *Vice-Presidents*, Prof. Henrijean, Dr. Conterman, Prof. De Nobele, Drs. Dubois-Havenith, Le Marinel; *Secretaries*, Drs. L. De Munter, Gunzburg; *Associate Secretaries*, Drs. Bienfait, Hauchamps, Henrard, Klynens, Wybauw; *Treasurer*, Gommearts. *Members*: Dr. Bayet, Profs. Beco, Corlin, Debaisieux, Demoor, Eeman, Heymans, Stienon, Van Duyse, Drs. Ciselet, Comot, De Marbaix, Mets, Descamps, Dubois, François, Froidbise,

Guilleaume, Joteyko, Lejeune, Ledent, Libotte, Letihon, Morel, Poels, Sand, Schaltin, Thieren, Verhoogen.

Brazil: President, Prof. A. De Brito; *Secretary*, Dr. E. Xavier. *Members*: Prof. Flores, Drs. B. DeMenezes, A. Alvim, J. Pedroso, P. Sanches, P. Viotti, Th. Carvalho, J. Ribeiro De Brito, Carvalho.

Spain: Honorary President, M. Don A. Dan Martin; *Acting-President*, Dr. M. A. Sanudo; *Vice-Presidents*, Drs. M. Taboada, E. Bejarano, J. Decref; *Secretary*, Dr. A. Perez y Fabregas.

Mexico: President, Prof. Altimirano; *Secretary*, Prof. R. Cicero. *Members*: Profs. J. Terres, D. Orvananos, G. L. Martinez, Drs. A. Pruneda, J. Y. Saloma, A. A. Loaeza, J. G. Uruena, M. U. Troncoso, D. Vigara Lope, L. G. Unda, G. O'Farril, A. Mendez.

Norway: President, Prof. P. F. Hoist; *Secretary*, Dr. Melbye. *Members*: Drs. Andvard, Bülow-Hansen.

Romania: President, Prof. G. Marinesco; *Vice-Presidents*, Drs. S. Georgesco, Demetresco-Braila; *Secretary*, Dr. Sarafidi. *Members*: Prof. Gerota, Drs. Botescu, Gracosky, Potarca.

Switzerland: President, Prof. Berdez; *Vice-President*, Dr. Keller; *Secretary*, Dr. Rollier. *Members*: Profs. Roux, Dind, Drs. Schultheis, Scholder, Frenkel, Grounauer, De La Harpe, Curchod, Bourcart.

* * *

MEETING OF THE AMERICAN ROENTGEN RAY SOCIETY.

The meeting of the American Roentgen Ray Society will be held in Cincinnati, Ohio, October 3, 4, and 5, at the Grand Hotel. The Grand Hotel is located at the southwest corner of Fourth Street, and Central Avenue, being within a few blocks of the most important shopping district and extending from Fourth to Third Street. The Third Street entrance of which is opposite the Union Station of the B. & O., C. & O., and Big 4 (New York Central), the L. & N. does also if requested by passengers. The Pennsylvania, Erie, and C. H. & D., arrive at other terminals, having direct connections by street cars. Arrangements are made whereby the convention hall, the exhibit and board room of the members are under one roof. There will also be ample accommodations for all upon either the European or American plans. Rates for the latter will be \$3.00 per day and up. Lantern slides are expected to be an important feature and every arrangement for which has been made. The lantern is of the best and the hall can be perfectly darkened.

Progress in Physical Therapeutics.

CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL.

EDITED BY WALTER H. WHITE, M. D.

The Physiological Effects of High Frequency Currents in Disease. By Samuel Sloan, M. D., F. F. P. S. G., Journal of Electrology and Radiology, April and May, 1907.

(Continued from page 426.)

Then follow the following observations:

1. These currents cause, in all cases, at first, peripheral resistance.
2. In all cases this is followed, sooner or later, by increased cardiac force when the currents are given in therapeutic doses.
3. The effects on the blood pressure and the pulse rate of this double action will depend on the cardio-vascular stability.
4. Should this be normal, there may be no change whatever on either the blood pressure or the pulse rate; only, as may be seen from Waller's table, an increase of blood flow, giving rise to slight elevation of the temperature of the blood.
5. Should there be slight cardio-vascular instability, then the diminished peripheral resistance is only in part compensated by the heart, and so the blood pressure falls slightly and there may be no change in the pulse rate (Table 2A).

TABLE II

		Before	Current	After			Before	Current	After	
Nov. 12, 1906...	Pulse	88	Current	88	Blood-Pressure	170	Current	158	(A)	
Dec. 19, 1906...	Pulse	81		68	Blood-Pressure	156		148	(B)	

Twelve applications from November 12, 1906, till December 19, 1906.

6. On the other hand, should the heart be in a state of asthenia, and the blood pressure have been already low on this account, then, if the patient, on reaching the couch, is for him fairly fresh, there having been nothing to depress or fatigue just before the treatment, the increase of cardiac force obtained from the current may so overpower the tendency to peripheral relaxation that the blood pressure rises whilst the pulse rate falls.

7. Should matters be as in the last case, with the exception that the patient has recently been fatigued or unduly excited, the heart may be unable to respond to the action of the current; just as the breeze that will fan a steady flame may extinguish a flickering one. The heart may be at first staggered; the cardiac force failing to rise to the occasion, the result will then be a dangerous fall of the blood pressure with a relatively high pulse rate. Any immediately succeeding fatigue, though moderate, may, in such a case, give rise to the need of stimulants (Fig. 3).

TABLE III

	Before	C	After
Pulse	85*	Current 300 ma. for 10 min.	84*
Blood-pressure	145		180
Temperature, mouth	98.8°		99°
" rectum	99.5°		99.4°

* Soft and small before, much fuller after.

8. The after effect is, in low blood pressure, due to diminished cardiac force, prior to the treatment, a higher level of blood pressure (Fig. 4). In this case the age of the patient was fifty-seven, and the blood pressure, which I took several times, to insure accuracy, was so low as to be unique, in my

TABLE IV

November 14, 1906.

	C		
Pulse	72	74	76
Blood-pressure	118	118	110
Temperature, mouth	98°	98.8°	99°
" rectum	99.8°	99.4°	99.4°
" room	70°	70°	70°

December 5, 1906.

Hour	3.50	4.5	4.20	C	4.45
Pulse	72	72	72	Auto-condensation: Current 500 ma. for 15 min.	72
Blood-pressure	103	102	102		103
Temperature, mouth	98°	99°	99.1°		99.2°
" rectum	100.2°	99.9°	99.8°		99.8°
" forearm	80°	94.5°	96.5°		97°
" room	68°	69°	70°		71.5°

Age of patient, 29.

experience, for that age. The improvement in the general health was, in this case, proportionate to the rise in the blood pressure; and the attacks of syncope, which had caused anxiety to his friends, completely ceased. The pulse rate, having been normal at the beginning—68 to 72—was unaffected by the treatment.

9. If the blood pressure be already high, due to the high peripheral resistance of albuminuria, with somewhat weakened cardiac action, the current will probably have the effect of raising the blood pressure without raising the rate of the pulse (Table 3).

Where the above is the case, and from long illness the cardiac asthenia is great, as shown by a high pulse rate, which no medicine could reduce, the effect on the pulse rate is striking. This case will be referred to again in the Urinary Excretion chapter in a chart showing the remote effect of the improved cardiac force on the kidneys.

10. When the blood pressure has been high for the patient's age and there is no apparent disease to account for it, I have observed that after several applications of the current the blood pressure is diminished and there is a corresponding improvement in the pulse rate (Tables 2 and 4). I shall show you presently the effect on the rhythm of the pulse in the case referred to in Table 2.

11. In some instances of intermittent pulse—radial only or cardiac as well—the intermissions may diminish or disappear, although, as in the case of W. B. M., this intermittent pulse had caused anxiety to the patient for many years (Fig. 5). Should the intermission have existed for a short period only as from temporary gastro-intestinal disorder, the intermissions of the pulse may cease after two or three applications of the current; probably from the beneficial effects of the current on the gastro-intestinal canal (Fig. 5, Mrs. F.).

TABLE V

Hour	5 27	5 33	5 50	5 58	6 4	6 10	6 15	6 23
Pulse.....	84	84	84	84	81	84	80	80
Blood-pressure....	240	215	185	185	182	185	185	180

Current 400 ma. from 6.5 till 6.20.

A very interesting case of intermittent pulse is cited. The patient was "run down" and "nervous." The cardiac innervation seemed unstable, and, though she came to the writer for electrical treatment, he hesitated and decided at first to put her on bromide of potassium and tincture of nux vomica. The pulse condition was characterized by ten intermissions per

minute. After the auto-condensation treatment, given for fifteen minutes, the pulse rate fell, and for ninety seconds no intermission was attested. Four days later the intermissions had decreased and disappeared after ten minutes of the current, after which the pulse was always noted to be regular. It was observed that in the early part of the treatment the temperature of the mouth and rectum were subnormal, the former being 97 and the latter being under 99. At the end of the treatment the temperature was observed to be nearly normal.

The writer states that he considers the tonic effects of the high frequency current on the heart to be of the greatest importance. He observes that "where the pulse is variable before the current application, it may become quite regular and steady immediately after. He cites one case in which the rate varied from 70 to 80 per minute. Following the auto-condensation, which he designated as the couch treatment, the rate was 78, and absolutely steady. This case, Fig. 5, shows the importance of allowing sufficient time for restoration of the cardio-vascular *status quo* before any conclusion can be come to regarding the effect of the current upon the blood pressure and on the pulse rate in any particular case. If the rise of blood pressure and the fall of the pulse rate result from previous exertion, a fairly good dose of the current may be given; the final result being to lower the pulse rate with no change of blood pressure. In such cases the tonic effect on the heart is evidenced by the lowering of the pulse rate without any reduction of the blood pressure. If, however, a rapid pulse be the result of very slight exertion and the blood pressure not have been high, danger may follow even a moderate dose. If the pulse rate rises as soon as the current is turned on, the patient, if asked, will probably complain of faintness after the end of the application. The tonic effect on the heart, however, will be shown later by the fall of the pulse rate and the rise of the blood pressure.

Immediate Thermic Effects.—The writer acknowledges the importance of Dr. Somerville's work investigating the problem of surface heat production as the result of high frequency currents which established, beyond question, the fact that such conditions would follow. The writer endeavors to show that these thermic effects are in no way physiological, but purely physical, and the reader is referred to Tables 6 and 7. He calls attention to the fact, in quoting from Waller, that the thermometer indicates the temperature of the body, not the amount of heat it produces or loses. It gives no measure of the activity of some productions or any indication that it is above or below normal. Two factors must be taken into account; heat production and dissipation; either of which may vary.

He then considers the subject of the effects of the varying

temperature associated with different proximates to the electrodes, comparing the mouth and rectum temperatures which

TABLE VI

Time	2.30	2.40	2.50	3	C	3.20	3.25
Temperature, mouth...	98.5°		98.2°		Auto-con- densation : Current 450 ma. for 15 min.	98.2°	
" axilla...	98°		97.8°			99.2°	
" forearm...		90°	91.4°	92°		94°	93°
" room....	61°		64°			66°	

TABLE VII

Time	4.40	4.45	4.50	4.55	C	5.20	5.30
Temp., mouth.....				98.4°	Auto-con- densation : Current 480 ma. from 5.5 till 5.20		98.4°
" rectum.....				99.2°			98.9°
" right forearm	90°	93°	94°	93°		96.5°	
" left forearm.	90°		92.5°			94°	

Electrodes in both hands.

TABLE VIII

	Intervals of 10 Minutes				C	After Current
Foot	78	79	79	78	Auto-condensa- tion : Current 500 m.a. for 15 min.	78
Groin	96	96.8	97	97.1		97.7
Rectum	99.2	99.2	99.1	98.8		99
Forearm	94	94.8	94.7	94.7		98
Axilla	98	98	98	98		98.2
Mouth.....	98.8	98.6	98.4	98.3		98.6

During Current.

	Intervals of 5 minutes		
Forearm	95.5	96.5	97.5
Foot.....	78	78	78

Temperature of room 63°, rising to 70°.

Electrodes in both hands.

are shown graphically in Tables 6, 7, and 8. These tables show that the greatest increase of heat is near the electrode, indicating plainly that it is not blood heat, but surface, or superficial tissue heat. "The heat production," he then concludes, "is the product of the resistance, as measured by the difference of potential, into the square of the current, and the closer these

points of potential difference are to each other, in proportion to the amount of potential difference, the greater will be the heat concentrated there," in accordance with physical law. "It can be easily seen that, considering the enormous ohmic resistance on the dry skin, this resistance, measured in air space,

TABLE IX

Time	6.48	6.58	7.10	7.20	C	7.42	Current to Zero
Right forearm.....	95°	95°	96.5°	96.8°	Auto-condensation : Current 500 ma. for 15 min.	98.2°	350
Right axilla.....	97.6°	98.2°	98.2°	98.2°		98.6°	325
Left forearm.....	94.8°	94.8°	96.2°	96.8°		97°	250
Left axilla.....	97.2°	97.8°	97.8°	97.8°		98°	320
Right calf.....		93.8°	93.5°	94°		95°	275
Left calf.....		92.5°	92.5°	93.6°		94.8°	300

Observations begun after having been one hour in warm room.

Electrodes in right hand and on left foot.

might quite equal the spark gap of 1 or 2 mm. between the hand and the forearm."

"Some of the rise of temperature in the mouth and in the rectum must be electro-physical, but how much, it would be difficult to say. I should expect, however, that this would tell more on the mouth temperature than on that of the rectum, when the electrodes are grasped by both hands."

Penetration of the Currents into the Deeper Tissues.—

The writer agrees with Dr. Lewis Jones that the currents enter into the deeper tissues and that the effects, as has been generally assumed, of the high frequency currents, does not arise from their action upon the peripheral nerve and the peripheral circulation, and he proceeds to sustain this position by reference to charts not shown in this abstract, in which it is shown that the potential difference from the hand to the mouth is practically the same as that from the hand to the rectum, and the potential difference from the neck to the groin is five times as great as that between the mouth and the rectum. "That is to say, the resistance and distance between the mouth and the rectum are not those by the chin, neck, breast, and abdominal walls, but by the gastro-intestinal tract. Again, the potential difference between the axilla and the groin is less than that between the axilla and the waist. Why, indeed, unless the current has gone from the axilla to the groin, not simply by way of the body wall, but also by the gastro-intestinal canal. I have come to suspect, indeed, that it takes an even easier road, namely, by the thoracic and abdominal viscera direct, as well as by the gastro-intestinal tract. For, if by the latter route only, then, though the ohmic resistance is not great, it is

greater than that of a number 14 copper wire, and the distance is quite as long as 25 feet. Since the current is thus seen to be acting on the whole lining membrane of the alimentary canal, there is no wonder that this electric energy has an influence on the appetite and on the general health."

Effects on Renal Excretion.—In investigating urinary secretions, he observes that the difficulty in the proposition of making observations from examinations of patients arises from the variety in the matter of diet, exercise, etc.; that such daily variations in urinary excretions of one day, or even an average of several days, cannot be taken as a criterion, but gives, however, in Tables 10 and 11 the results extending over periods of time sufficiently long to note positive results from the results of auto-condensation treatment, as will be seen by careful study of these tables.

TABLE X

In 24 Hours	March, 1906			C	March, 1906			Average Before	Average After
	4	5	6		17	18	19		
Urine, ounces	28.5	26.5	21.5	Current daily	25	34.5	30	25.5	29.8
Solids, grains	660	672	589		707	834	660	640	733
Urea "	192	172	193		235	269	240	186	248
Purins "	5.97	5.83	5		5.8	7.4	6.3	5.6	6.5

Ratio of purins to urea before = 1 to 33.

" " " " " after = 1 to 38.

In 24 Hours	10.12.06	10.28.06	11.9.06	Average
Urine, ounces.....	45	37	38	40
Solids, grains.....	742	651	1003	798
Urea "	225	222	304	250
Purins "	7.4	8.1	7.9	7.8

Ratio of purins to urea = 1 to 32.

"This table shows a steady advance towards the normal; taking as this the urinary excretion of several months later, when the condition of the patient is noted as "very good," though there still existed the kidney disease, as evidenced by a trace of albumen being constantly found in the urine. This is only one case, but it may be none the less a valuable one. It is one that I have been able to watch and to gauge the progress of with exceptional care and accuracy. In a case like this, where so much benefit has followed the treatment, the question arises: What has been the primary action of the current? Dr. Alexander Robertson, formerly Professor of Medicine St. Mungo's

College, was in charge of the case, and I was acting in conjunction with him. It was one of a very slow convalescence from uræmic convulsions. Coma had lasted for about a week; general blood-letting had been resorted to, and for some days it seemed impossible for the patient to recover. Convalescence, as I have said, was very protracted, and after ten weeks no appreciable progress was being made, the pulse remaining between 96 and 102. No medicine seemed to have any influence on the pulse rate. At this stage I suggested high frequency treatment. I said I felt sure it would do some good; whether by influencing the general health through the kidneys or the latter through the former I could not tell. It was purely empirical knowledge only I could speak from then. Dr. Robertson agreed to the trial. We decided to stop all medicines and simply to note the condition of the patient from day to day, allowing ten days for this before beginning the electric treatment, in order that we might be able to eliminate any source of error in the final result.

"I have no records in this case of the blood pressure at this stage, because this was always taken by means of the Hill and Bernard sphygmomanometer, in which I have explained to you I have no confidence; but later on, at about the same time this patient's health is noted as "very good," the pulse after rest was found to be 88, and the blood pressure 218 by the Riva Rocci (Martin) sphygmomanometer at 8 p. m. The blood pressure therefore may be taken at the period of convalescence indicated as about 180 to 200; and the cause of the high pulse rate at that time as the blood pressure plus the cardiac failure, especially the latter.

"Into the question of purins in the blood and their effect on the circulation and on the general health this is not the occasion to enter. I have been studying this question for many years and have made a large number of examinations of urine in connection with the subject. Whilst Haig may be, I believe is, right in many cases in withholding a diet rich in uric acid, I have come to the conclusion that, in the case of most people, if only the diet is suited to the individual *in quantity* and a fair consideration given to the natural instincts in the matter of appetite, attempts should be made to improve the cardiac force and to set right the gastro-intestinal digestion, leaving the purins to take care of themselves; rather than to try to rectify faults of metabolism by washing out the purins or taking special steps to avoid their intake. . . .

"If you examine Table 10 you will see that whilst the average daily amount of purins in the early part of the treatment is 5.6 grains, that excreted later is 6.5 grains; whilst that at the time of greatly improved health is 7.8 grains. The relation of purins to urea again became lower after the treatment and was again higher at the later stage of improved condition. Prob-

ably each man has his own purin ratio as each one has his own urea factor; and until we can ascertain this for the individual in health it is a waste of time to argue as to the effect of the increase or decrease of the purins excreted on the general health."

TABLE XI
Case A

In 24 hours	December			C	December			Average Before	Average After
	8-9	9-10	10-11		24	25	26		
Urine, ounces	47	45	51	Current 10 applications 500 ma. for 15 min.	30	38	42	47.6	36.6
Solids, grains	1189	940	953		792	1045	924	1027	920
Urea "	470	450	408		345	418	399	443	387
Purins "	11.7	10.8	11.8		6.7	10	12.3	11.4	9.6

Ratio of purins to urea before = 1 to 38.

" " " " " after = 1 to 40.

Case B

In 24 Hours	November			C	December		Average Before	Average After
	23	24	28		26	27		
Urine, ounces	34	29	43	Current 12 applications 450 ma. for 15 min.	47	35	35	41
Solids, grains	785	669	851		982	1001	768	991
Urea "	—	—	344		446	350	—	398
Purins "	—	—	12.1		11.9	15.4	—	13.6

Ratio of purins to urea before = 1 to 28.

" " " " " after = 1 to 29.

Case C

In 24 Hours	November			C	December			Average Before	Average After
	13	20	22		16	17	18		
Urine, ounces	72	84	72	Current 6 applications	66	66	60	76	64
Solids, grains	1188	1293	1108		1089	1089	990	1196	1056
Urea "	432	504	468		—	462	420	468	441
Purins "	17.7	18	16.7		15.8	16.3	13.9	17.4	15.3

Ratio of purins to urea before = 1 to 27.

" " " " " after = 1 to 28.

"Look at Table 11. Here in case A we have practically the same ratio of purins to urea at the close as at the beginning

of the treatment, although the treatment immediately improved the general health." The same may be said of another case where the ratio is 1 in 55 before, and 1 in 53 after treatment; and yet my notes say regarding this case at the close of the treatment: 'General condition improved, no rheumatism, no restlessness of legs now.' The rheumatic condition must be more than a mere matter of purins."

"Look again at B and C, table 11, and you will find very little change in the purin urea ratio in either, and yet, in the former at least, the condition improved vastly after the electric treatment."

"In case B, one of obesity, the urea and the purins have both increased under the treatment. I have pointed out, however, that this is not an invariable result. Indeed, looking at case A, you will see that where a like benefit had followed, exactly the opposite had occurred.

"I have left myself very little time to speak of the Joulie urinary coefficients. Let me just say that by this is meant the actual amount of phosphates of the *urina sanguinis*, per litre per cent. specific gravity divided by the total acidity per litre per cent. specific gravity. "The normal figure for the phosphates reckoned as P_2O_5 is 11.17, that of the acidity 4.55; the ratio being thus 2.45."

"From the variation in these figures Joulie draws important conclusions regarding the metabolic processes and the indications for treatment. Whether electric treatment by high frequency currents would modify these figures, I have not yet settled in my own mind, though I have made numerous experiments in this direction."

Retino-Cerebral Mechanism.—"I have considered the physiological effects of high frequency currents from the points of view of the cardio-vascular, thermo-genetic, gastro-intestinal, and renal systems. Can any of these, or all of them put together, explain the various signs and symptoms we know to expect from this treatment? I am sure they cannot. They give no explanation of certain sensations remarked upon by patients when undergoing auto-condensation treatment. One patient will say that the after-effect is a sense of "comfortable weariness in contrast to fatigue or faintness." Another I have heard remark: "I feel, for an hour or two after, a restful weariness, which is just lovely." One lady, after the vacuum electrode from the high frequency solenoid had been applied to the supra-orbital region for neuralgia, remarked to me the following day: "I don't know what you have done to me or how you have done it, but since yesterday a load has been lifted from my mind and all my cares are gone." For years this lady seemed to have a weight of care on her, and there had, I knew, been much cause for this. Yet at her subsequent visits and till I last saw her she declared that her burden of mental distress

had not returned. Unfortunately this is an exceptional case; but it will serve as an illustration of the point I wish to enforce, viz., that some action on the central nervous system takes place under the therapeutic use of these currents. How is this effect to be seen or measured? We cannot see what is going on in the brain, but we may see and measure what is going on in the retina, which, after all, is a prolongation of the brain. What is called the "after-image" may by the measurements of its duration give us some indication of the condition of the retino-cerebral mechanism. Physiologists whose works I had consulted, declared that the duration of this after-image was proportional to the cerebral fatigue present. Haig maintains that the undue prolongation of the positive after-image is due to a state of collemia of the capillaries of the retina, and this condition, according to him, is caused by excessive uric acid in the blood, which again is a cause of cerebral malnutrition. I tried to measure the duration of the positive after-image on myself, but gave this up, for several reasons. The exposure of the eye to a strong light for several seconds was uncomfortable, if not mischievous, besides, it seemed impossible for me to fix a moment of time in the course of its disappearance as a measure of its duration, and further, it continually eluded me in my endeavor to keep it stationary. I then decided to measure the duration of the negative after-image as an index of the cerebral fatigue. I soon, however, had reason to doubt whether this, the duration, was directly proportional to the cerebral fatigue, and I began to suspect that it was rather inversely proportional to this; since the fresher I was, the longer did the after-image remain. I also noticed that the duration was longer in the morning than at night, and longer with the young and the strong than with myself. On satisfying myself as to these points I consulted various other authorities and discovered that the opinions of physiologists were about equally divided on the subject of the after-image as an indicator of the retino-cerebral condition; some maintaining that its duration was directly proportional to the fatigue, others that it was inversely so.

His experience has led him to the following conclusions:

That the duration of the negative after-image is different in different individuals. That in the same individual it differs according to the state of the health, being longer when the person is well and fresh than when ill and fatigued; according to the time of day; being, at least in my own case, longest just after breakfast, and shortest at bed-time. I could, indeed, tell with a fair amount of certainty how fit or unfit I was going to be during the day by taking my negative after-image in the morning, and I could fairly correctly gauge what it was going to be when I had finished my day's work. When, by reason of temporary good spirits giving me the feeling of being particu-

larly fit, I expected to find it high in spite of a specially hard day's work, I discovered that this was not the case; the duration being proportionate to the previous fatigue. I can, with a metronome, beating half seconds, reckon the duration in my own case to a quarter of a second. A considerable amount of experience is necessary, however, to be able to measure with sufficient scientific accuracy the duration of even one's own after-image. Accordingly, I have not been very successful with other people; but I recommend the matter to your consideration as interesting and as of scientific value. The examination must take place as nearly as possible at the same hour, the light must be the same, the distance of the light from the image the same, and the distance of the eye from the object and the image also the same, as well as must the metronome beat exactly at the same rate and for the same number of half seconds, before the eye is turned towards the white paper. The image generally appears at once, but with some people there is a delay of a few half seconds before its appearance. With most the image returns two or three times, but this is not reckoned in the measurement. Unless the eye be kept fixed on one spot the record is spoiled. Accordingly, I have, as you see, fixed a pin in the center of each paper to keep the eye fixed on, since if it wanders from the spot it was originally fixed on the image at once disappears.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

Action of the Uviol Light on the Skin, and its Therapeutic Use in Dermatology. By Carl Stien and Dr. Hesse, Archives of the Roentgen Ray, August, 1907. From a condensed translation from the Muenchener Mediz. Woch. of February, 1907.

This report of the actions of the Uviol light (modification of the Cooper-Hewitt light) treats of the action of the light upon the normal skin and also as a therapeutic agent. The writer's experiments demonstrate that this light will produce a slight erythema with an irradiation of fifteen minutes, at a distance of five centimeters, and after a lapse of five hours, a patch of redness appeared over the area of irradiation. This increased during the next few hours to a uniform redness, which disappeared on pressure. The redness would increase for two days, remaining one day at its height, dying down on the fourth day to a brownish discoloration, which did not disappear upon pressure. This was succeeded in from four to six days by a lamelliform desquamation, followed by slight discoloration, which after some time disappeared. The action of the light was shown to be more intense with blondes, and

far less marked than it is with dark complexions. Ten minutes may suffice to raise a blister upon the light skin, while forty-five minutes would barely cause a redness upon the shaven scalp of a dark-complexioned boy. In a case of indurated

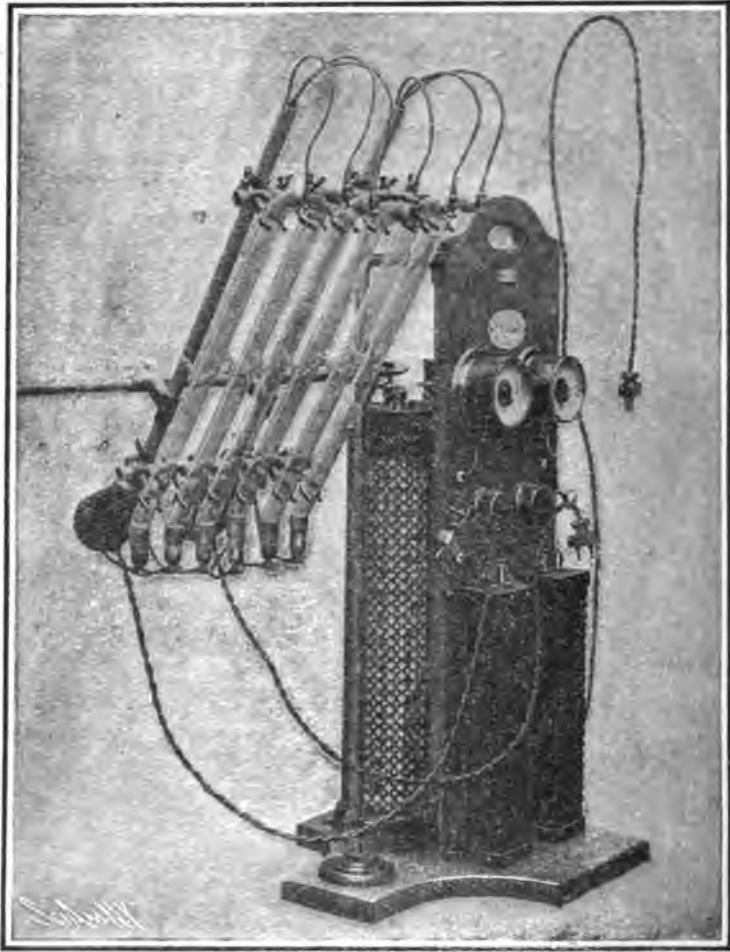


Fig. 1.—The Uviol lamp.

eczema there was no apparent result from prolonged irradiations of half an hour to an hour, repeated every day for a week.

Observation shows that Uviol light produces only a condition of hyperemia without any histological change, the appearance being that of a severe solar hyperemia, without deep-seated effects as occurs after exposure to the Finsen light.

It will be readily understood that such a hyperemia is conducive of an improved condition of the skin, making it valuable in the treatment of superficial dermatoses. Uviol light has little or no influence on bacteria. Cultures of staphylococci on agar were not influenced by an irradiation of twenty minutes' duration. Eczemas, psoriasis, alopecia areata, trichophyton, favus, sycosis, phagedenic ulcer, and lupus were treated by Uviol irradiations.

In each case the effort was made to produce erythema, the area first being cleared from scales or crusts. The surrounding surface was covered with a paper shield or zinc paste. A few long exposures were more efficacious than shorter irradiations. Well-marked redness was produced in each case. After removing the resulting desquamation five per cent. sali-

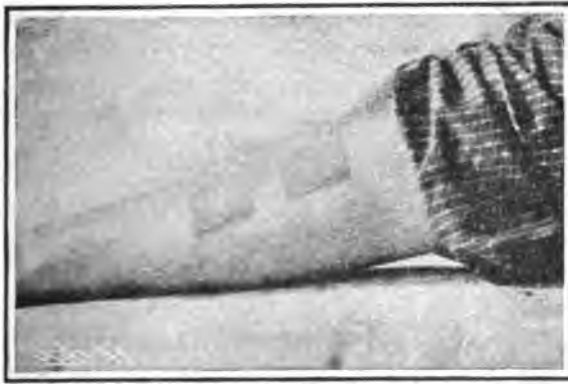


Fig. 2.—Effect of radiations of Uviol lamp through opening in a paper screen.

cyclic ointment was applied. After a complete rest of desquamation a second irradiation was given, if the first had not produced a complete cure. It was found that the Uviol light was contraindicated in acute cases of *eczema*, though in sub-acute cases single irradiations will often dry off the skin with the subsequent desquamation and a complete cure after two or three exposures, but failed utterly in a case of inveterate *papulous eczema*. In another of universal *pruriginous eczema* great improvement set in after a course of several irradiations. Nine cases of complete cure are reported of chronic recurring seborrheic eczema.

The treatment is not adopted to *psoriasis*. In two cases, however, the head was treated with the Uviol light after removing the thickened crusts followed by complete success after three irradiations each of one half hour at intervals of five days. This treatment was successful in two out of three cases

of *alopecia areata* treated. In one of seven years' duration the surface was irradiated for twenty minutes every fourth day for six weeks. Hair began to grow after four weeks. Three cases of *herpes tonsorans* after six to seven weeks' treatment were successful, the fungus being destroyed and a regrowth of healthy tissue appeared and this without any other treatment. One of the cases was cured by four exposures each of thirty minutes at intervals of a fortnight. It was found to be useless in the treatment of *favus*, also in *sycosis*. It was found to be of some value in the treatment of *chronic ulcer* but not superior to other methods of treatment. Combined with the application of perhydrol, success is reported in two cases of *venereal ulcer* which had not responded to other methods. No claims are made for it in the treatment of lupus. The best results seem to be obtained in eczema, especially in seborrheic eczema of the scalp, psoriasis of the scalp, and herpes tonsorans.

The cuts shown in this article are from an article published in the Scientific American of February, 1903. It is probable that those who are in command of the means and familiar with the high-frequency currents, including the resonator spark and the static brush-discharge, or the marine search-light, will find that the Uviol lamp or the Cooper-Hewitt light will hardly be an essential addition to a physician's armamentarium, as equally good results are obtained in the hands of those who understand the employment of those measures. Furthermore, claims made by the German manufacturers that a certain glass employed in the manufacture of these lamps permit the passage freely of ultra-violet light, for careful tests show the contrary to be the case.

[Editor.]

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Changes Produced in the Kidneys by Roentgen Rays. N. Y. Med. Jour., May 25, 1907.

Warthin presents the following conclusions, (1) exposure of small animals to the rays for half an hour produces slight nuclear changes in the renal epithelium. This is recovered from, but is followed by albuminuria and cloudy swelling, which is proportional to the degree of lymphoid destruction; (2) if animals are exposed until death occurs the renal cells will be found small and cloudy and tubules distended with an albuminous precipitate; (3) continuous exposure for five hours is fatal within ten days, death following paresis and coma, which symptoms have a definite relation to the lymphoid destruction and the kidney lesion. The symptoms may imply

- injury to the central nervous system or auto-intoxication; (4) it follows that the destruction of leucocytes in the treatment of leucemia by x-rays may be injurious to the central nervous system or the kidneys. Hence, with prolonged and repeated irradiation of the lymph nodes and spleen in human beings, possible renal injury must be considered and repeated examination of urine made; (5) x-rays disturb the chromatin of all cells: the lymphoid cells and epithelial cells of the testis being most sensitive, the renal cells being less so. All cells capable of rapid proliferation or renewal are especially susceptible to x-ray influence.

The Use of the X-Rays in Diseases of the Blood and of the Blood-Forming Organs. By Henry K. Pancoast, M. D., New York Medical Journal, March 23, 1907.

In this paper the writer has collected and reports from his own experience and that of others one hundred and twenty-three cases of leucemia, pseudo-leucemia, polycythemia, splenic anemia, and pernicious anemia, treated by the x-rays. Of these cases of leucemia the final reports have been made in sixty-three cases, a little more than fifty-one per cent. Four are living and well, sixteen had a symptomatic cure, then relapsed and died, five had a symptomatic cure with relapse and are living, though in a grave condition. Eighteen improved, had a relapse, and died of the disease or had intercurrent affections. Sixteen showed no effect or were but slightly improved and died; four showed a symptomatic cure, had relapse, and were under treatment at the time the paper was written. Only six in thirty-five per cent. were alive and well from three to six years after the primary symptomatic cure. He finds the rays frequently produced a toxemia, which hastened the death of the patient, also he points out that intercurrent disease frequently improves the condition in the patient as well as in others hastens the inevitable end. He does not consider that the rays are a specific in this affection, that it only relieves the symptoms and not the cause. Therefore relapses are very likely to follow. He accepts the theory that the destruction of the leucocytes and abnormal deposits of lymphoid tissue are due to stimulation of an autolytic process through action of the x-rays. There are forty-four cases of pseudo-leucemia reported in the paper. The final outcome is known in twenty-nine, 66 per cent. of the total number: 27.6 per cent. are alive and well three or four years after the first symptomatic cure, 65.5 per cent. are dead or soon will be, while 6.9 per cent. are still under treatment. He points out that three cases died from toxemia induced by the treatment and the results are better in this disease than in leucemia. He records four cases of polycythemia, twelve of splenic anemia and five of pernicious

anemia treated by the rays. One of the pernicious anemia, already suffering from a toxemia was seized with alarming symptoms after a single exposure of four minutes, and died four weeks later. He considers that in such serious conditions, as pernicious anemia, pneumonia, typhoid fever, acute nephritis, pyanemia, leucemia, and pseudo-leucemia, the x-ray treatment should not be given and skiagraphic or fluoroscopic examinations should not be made with coincident metabolic study.

"Comment on X-Rays as Applied to Prostatic Enlargement."

By L. Bolton Bangs, M. D. Medical Record, June 1, 1907.

The doctor comments very fully and completely on one case. The patient, a well-nourished and vigorous man of sixty-four, who had been suffering for ten years, more or less, from the symptoms of prostatic hypertrophy. At first he was relieved by cathetherization and the passage of sounds. But some time later the symptoms became worse and he was advised to try the x-ray treatment. After one month's treatment with the x-ray he ceased to use a cathether, at which time he had had sixteen or eighteen treatments. He declared that he was improved in every way immediately. After some time, he had another course of x-ray treatment and then left to go to the warmer climate of Egypt, where he experienced great relief, but with an occasional relapse of symptoms. In December, 1906, he had twelve more x-ray treatments and had to discontinue them on account of the dermatitis developed. Later, on coming into the hands of Dr. Bangs, it was found that he still had, on the average, a residuum of eight ounces of urine, and the prostate was enlarged about four times its normal size. The doctor fails to see where he was improved with x-ray.

The editor of this department does not believe, in proper hands, that there is any doubt that benefit can be given in these cases by means of the x-ray, but as they are so much benefited by the Morton wave current from a good static machine that he thinks it is rarely a necessary expedient or wise to depend entirely upon the x-ray, and that the electrotherapist should not depend entirely upon the x-ray in any case when a combination of means is so much more liable to give more definite and permanent results.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Chloride and Water Excretion in Typhoid Fever, with Copious Diuresis.

Torald Sollman and J. A. Hoffmann (in American Journal of the Medical Sciences) investigated the urine secretion in typhoid as influenced by unusually large diuresis, the consequence of a very free administration of water. They found that the free administration of water to typhoid patients causes a large polyuria. The percentage of chlorides and the total molecular concentration are much below normal, while the daily excretion of total dissolved molecules exceeds that of ordinary typhoid cases. Therefore, the eliminating capacity of the kidneys is not injured by typhoid fever nor by a prolonged diuresis. No accumulation of fluid appears to occur in the body, the excretion being very nearly parallel to the income. The quantity of urine is influenced by the perspiration and to a lesser extent by catharsis. It appears probable that the perspiration is freer under the influence of the large administration of fluid. Diuretics do not increase the polyuria nor does the administration of calcium chloride appear to diminish diuresis. The effect of the polyuria on the chloride excretion, as compared with ordinary typhoid cases, consists in a diminution of the percentage and an increase of the amount excreted daily. Minor variations in diuresis affect the percentage, but not the daily output. The chloride excretion varies strictly with the chloride income. The excretion of water and chlorides appears to obey the same laws as in health. There is, however, a greater tendency to chloride retention in the fever. The difference appears to be only quantitative and not qualitative. It is greatly diminished by polyuria. The prolonged restriction of the chloride income appears to produce no deleterious effects, and the patients do not develop any "salt hunger."

Copious Water Drinking and Polyuria in Typhoid Fever.

Edward F. Cushing and T. W. Clarke (in American Journal of the Medical Sciences) report on the results they obtained in prescribing large quantities of water to typhoid patients. It was soon found that, without discomfort, or special reluctance, on the part of most patients, the unexpected and unusual amounts of from a gallon to a gallon and a half or even more could be taken in twenty-four hours, providing the water was administered in small quantities, four ounces, at definite and frequent intervals, every fifteen minutes during the waking hours. In addition to this, the ordinary

patient received, every two hours during the day and once or twice at night, alternately, six ounces of milk and six ounces of albumin water. The resulting diuresis was marked, the degree of polyuria, day by day, closely corresponding to the quantity of fluid ingested. Furthermore, the total nursing care of these patients was less than of those not so treated, and their general comfort seemed apparent. Headaches were not so troublesome; tongues and mouths kept noticeably clean and moist; apathy, deafness, restlessness, nocturnal delirium, and other nervous and toxic symptoms seemed less in evidence; hypnotics were not so often needed; nausea was unusual, and remission from temperature appeared more frequent. Complications were few, and there were no deaths among fifty-six cases so treated, although the prevailing epidemic was of severe type and the general mortality, on the whole, was large.

THERMOTHERAPY.

EDITED BY DAVID E. HOAG, M. D.

"Hot and Cold" Applications in Medicine. By A. C. Blackburn, M. D. The Therapeutic Gazette.

Under the above title the writer very aptly discusses the respective physiology of heat and cold.

He takes the view so often put forth in these columns before that heat and cold are not two distinct forces, but rather relative conditions of the same force namely, caloric.

We use the term cold relatively as it is the point at which there is no sensible heat. By cold we mean something that abstracts heat from the body. By the term heat something that communicates heat to the body.

He briefly speaks of the physiological effect of heat upon the nervous system as, a transitory excitant followed by a sedative and depressing action.

The heart is accelerated in direct proportion to the amount of dilatation of the superficial blood vessels. Respirations are first increased and then slowed. All secretions are increased. The muscular tone of the intestines is lowered and constipation results. In speaking of the physiological action of cold, the author believes what has been often stated, that the first action is to cause a congestion of the superficial vessels soon followed by extreme contraction of the parts with a profound lowering of temperature. If the functions are good there are reaction, increased circulation, and restored heat.

The author firmly believes, that the primary physiological action of heat is on the nervous system, and cells of the body.

Secondarily, for the absorption of heat. It is antispasmodic, anodyne, and anesthetic. He then reviews the various uses that the hot and cold baths can be put to, stating the well-known fact, that experience must be the guide as to which shall be used.

The different forms of administering the baths are then taken up, and a warning is given that much harm is often done by the Turkish, Russian, and other hot baths, where a temporary improvement is followed by an aggravated state due to over-stimulation. The dry hot air apparatus is then taken up and described, and it is believed by the author that this form of applying heat is especially adapted to subacute or chronic conditions following disease or injury, and in myalgias generally. The author points out that the very great benefit obtained by patients, both at home and abroad depends upon hydrotherapy, diet, exercise, etc.

For instance in the use of hydrotherapy it is pointed out that it is not the mineral constituents contained in the water used for bathing and for drinking purposes that makes it beneficial as the laity commonly believe, but rather the excellent manner in which it is applied by trained assistants. By accessory forms of treatment in addition to hot air are meant the various forms of massage and electrical treatment, which add greatly to the benefit obtained in certain conditions. In the domestic use of the cold bath mention is made of the value of the cold bath for its tonic effect upon rising in the morning, especially for those who react promptly. A cold shower bath after exercise followed by a brisk rubbing, prevents muscle soreness. Cold sea bathing is regarded as beneficial and stimulating when moderate in length, and not prolonged to the point of depression.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

Liquid Air in Dermatology: Its Indications and Limitations.

By Henry H. Whitehouse, M. D., Jour. A. M. A., August 3, 1907.

Dr. Whitehouse speaks of the divergence of opinion by his dermatologic confrères in New York City respecting the value of liquid air in dermatology, there being a general unanimity of opinion as to its efficacy in some affections, while in others there is a striking variance. He thinks this is the history of every new therapeutic agent, especially if a little out of the ordinary.

He cites the x-ray as one of the therapeutic agents in which there is a great difference in the effects produced and the results obtained, also a great difference in the interpretation of its real powers, as well as the variations in the technic employed. The author goes on to state that the immediate effects have been so definite in some instances, that he feels firmly convinced that we have here a remedy of real worth, in a limited field at least. With it results may be obtained in some conditions that cannot be approximated by other means at our command, and in one instance at least it was the means of arresting a malignant process that was destined, in a few months, to destroy the life of the patient. An agent which can do this, if only in one instance, certainly warrants our most careful attention.

Dr. Whitehouse deplores the fact that it cannot be obtained for general use and is not always to be had when most needed. Its unstable qualities prevent us from obtaining it commercially, and our future supply must come from technical and scientific schools and colleges, i. e., for medical purposes.

The author goes on to enumerate its general properties, physical, clinical, and therapeutical. He shows that laboratory experiments although not uniform, demonstrate pretty conclusively that liquid air is incapable of destroying germ life, and it is reasonable to suppose it is incapable of more than inhibiting the activity of pathogenic organisms in the living tissues.

"To explain the therapeutic properties of liquid air we must look, therefore, to changes in intracellular metabolism rather than to any bactericidal effect. Cell life is manifestly impossible in the prolonged presence of this agent, for the two chief essentials to living protoplasm, viz., heat and moisture, are here lacking. The sudden shock of its application contracts the blood vessels to the highest degree, but the normal temperature is soon resumed, although if frequently repeated, a most powerful local stimulation is produced and ultimately endarteritis. The intense inflammatory reaction following its application causes a flooding of the lymph spaces with serous exudates, and to this is due its therapeutic effect in cutaneous cancer, some of whose disordered cells lie in these spaces in the periphery of the growth. By constantly inhibiting the activity of bacteria, in conditions known to be due to such invasion, their pathogenic power is nullified, for a time at least, thus allowing the inflammatory exudates to cope with them, the product eventually being carried off in the lymph stream."

The writer continued by saying, "that liquid air is something more than a caustic, in the true sense of the word, for sloughing and sphacelation are not essential to the accomplishment of its therapeutic effects." He said, "he had seen

this repeatedly exemplified in the treatment of vascular nevi and angiomata and in new growths covered with a sound epidermis which was free from moisture. A drop on the sound skin causes a sensation of burning and tingling, and, if allowed to remain in contact a moment or two, will cause a blister. In the absence of moisture no slough nor death of tissue takes place, but on a perspiring skin contact immediately ensues, and a blister is quickly formed; on a denuded or moist surface, a slough with loss of tissue follows."

"A mild and short exposure to the normal skin by means of the spray produces blanching, followed by a moderate congestion; a longer exposure thoroughly freezes and anesthetizes the part, but if not distally situated, as ear, toe, finger, etc., the circulation is slowly restored without affecting its integrity."

"In applications with the swab, the resulting inflammatory swelling varies in degree according to the amount used, the pressure employed, and the location and character of the tissues. If these are firm and well nourished it is often very considerable, while if ill nourished or in a senile condition, irrespective of the age of the patient, a large dose will cause little or no reaction. These observations are important in the practical use of the remedy, for it enables the physician to confidently tell the patient just what he is to expect."

"The pain accompanying its application is very slight and rarely lasts long, but in some cases, especially when in proximity to the teeth, it will produce excruciating pain, sometimes enduring for an hour."

"In pathologic conditions it relieves pain after a few applications, and lessens discharge and odor. It likewise diminishes tendency to hemorrhage, although there is always a surface oozing during the congestive stage, when applied to an open surface."

"Mild applications will encourage healthy granulations, while stronger ones will destroy exuberant growths."

"In pigmentary, hairy, and vascular nevi, angiomata, lymphangioma circumscriptum, lupus erythematosus, and lupus vulgaris and epithelioma (unaccompanied by lymph gland invasion), we have in liquid air a remedy which will often give us better results than we have been in the habit of getting by other means."

The author goes on to describe the technic in which lies the kernel of success, in this as well as in almost every branch of practical medicine. As the description is too voluminous to be reproduced in this abstract, we will only mention a few essential points. He no longer uses the spray method, as it is difficult to limit the area of exposure. The cotton swab is applicable to all conditions. Pine sticks which can be made

flat, pointed, round, or paddle-shaped, firmly wound with absorbent cotton, are used. In making applications the excess of liquid should be shaken off, scabs should be completely removed from all lesions to be treated, and thin gauze must intervene between the applicator and all mucous or denuded surfaces, or otherwise swab will freeze fast. The elements governing the effect produced are (1) the degree of saturation of the swab, (2) the accuracy of contact, (3) the amount of pressure exerted, and (4) the duration of the exposure. "On a thorough appreciation of these four elements, coupled with correct judgment respecting the interval allowed between exposures, which is a variable quantity according to the character of lesion and the effect of an antecedent treatment, depends wholly the success or failure in treatment. The amount of pressure and its duration, granting the contact is accurate and saturation is adequate, seems to be the keynote to the effect produced in any given application."

The author relates the history of six cases of nevus pigmentosus, treated with liquid air, all cured with from two to five applications. Four cases of nevus vasculosus were cured in from two to four months' treatment; several of lupus erythematosus and vulgaris were cured, or nearly so. Fifteen cases of epithelioma were reported in which all were benefited or cured after other treatment had been tried.

In the discussion which followed, Dr. Wm. A. Pusey of Chicago says he has substituted liquid carbon dioxide, which can be obtained anywhere, for liquid air, which is so hard to obtain. His experience with carbon dioxide corresponds exactly with that of Dr. Whitehouse with liquid air. Although liquid air is twice as cold, Dr. Pusey thinks carbon dioxide is better for therapeutic purposes. In his opinion the usefulness of both agents depends on the fact that they are destructive agents whose actions are readily controllable.

Dr. H. W. Stelwagon of Philadelphia, Dr. Geo. T. Jackson of New York City, and others who discussed the paper, agreed in its beneficial action, but there was a difference of opinion in regard to the amount of pain produced by the application. Some thought the pain very severe, sometimes lasting for two or three hours. Dr. Whitehouse claimed the pain could be relieved by applying ice-bags. As a result of the disease and the treatment a white, soft scar was left, which could be rendered less noticeable with a better knowledge of the technic.

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THE INTER-RELATIONSHIP OF GENERAL REACTIONS AND LOCAL CONDITIONS AS CAUSES OF DISEASE AND OF CURE.*

BY MORRIS W. BRINKMANN, A. B., M. D., NEW YORK.

The fact is notorious that history has described many procedures for the alleviation of the sick, which were strictly negative from a physico-therapeutic point of view; that is, results of a more or less satisfactory character developed, in the absence of any measure which could be called a treatment. It is immaterial by what name or description these procedures have been known, whether by the incantation of a savage healer, by the magic of a barbaric specialist with his supposedly sacred implements, by the mysticism and suggestion of Mesmer or by any of the more recent cults regardless of their name or announced theories or principles, the causes underlying such results, as were or are apparently attained, and the explanation of these results are most simple, being due to an ever-present force.

This force existent since animal life first developed, inherent in, and essentially a part of life, was known and described by the earliest writers of the healing art, and is recognized by us as the "*vis medicatrix naturæ*." Our most recent writers speak of it as, the intrinsic and inevitable tendency to recover from disease. No healing or cure ever occurred without the action of this force, nor can it ever be otherwise. Only as we are able to utilize this inherent power residing within the mechanism of the living being, are we entitled to consider ourselves as qualified to be called scientific physicians. Those who are ignorant of or who pay no attention to this essential truth have never approached the portals of true therapeutic knowledge.

* Presidential Address read before the Seventeenth Annual Meeting of the American Electro-Therapeutic Association at Copley Hall, Boston, September 17, 1907.

Those who are entirely ignorant of the nature of the automatic reparative process inherent in the living mechanism, are frequently attracted and pleased by phenomena which to the initiated are causes for well-founded and grave apprehension.

It would be a useless and an extravagant waste of time to enter into any detailed discussion of the physical agents at this time, since the ground I desire to cover lies more in the direction of the choice of a general plan and special measures in our work. My effort also will be to broaden our views and our work by considering a much neglected subject of the most practical character, and possessing an intense interest for those who grapple with our special problems in a philosophic spirit, men who get underneath the surface ripples.

The inter-relationship of general reactions and local conditions is a study whose importance surpasses every other, as applied to diagnosis, prognosis, and therapy. For the most masterful technique with precise agents is valueless; when the resulting phenomena are not appreciated, utilized, and further developed within the limits of possible and desired results.

The outlining of a general course of procedure for a given patient being comparable to a military campaign, every move being made with reference to some ultimate result. The necessities of the moment frequently requiring some shifting or variation of tactics. Nothing however being allowed to interfere with the attainment of the goal which was originally planned and whose attainment is ever present to the alert and judicial mind which controls the details of the contest.

Variations from normal physiological conditions are so diverse both quantitatively and qualitatively that the logical mind has been occupied from the dawn of medical history in arranging and classifying phenomena, so that broad generalizations could be made, in order to accurately group the symptomatic manifestations in the sick, to accurately group the signs and symptoms with reference to the underlying cause. We now know that the symptoms are produced not alone by the action of a cause upon the tissues, but by that action plus the reaction of the tissues against the cause. The view of the nature of disease must materially influence our views as to the nature of the processes, and forces us to consider the

individual or his tissues, fully as much as the primary cause. Collectively therefore our therapy is influenced materially.

The symptoms in the sick consequently cannot be said to be the only prominent point for consideration, there being other factors of material importance in a rational therapy.

Underlying all of the multitudinous groupings of phenomena which have been schemed into our heretofore accepted classifications of disease, are causes which in the most remote antiquity were recognized and explained by the humoral pathology. The cycle of thought and observation has again through recent investigations revolved to a somewhat similar point of view.

The chemistry and physics of the human body are fixed by structural and physiological conditions and the natural laws concerned in all the actions going on in the body, as well as the forces and matters of the environment of the individual. Not one of the many conditions in and around our patient should be neglected by us, many of the simplest procedures being productive of the largest results.

The leading thought which I here wish to impress is the undeviating certainty of the operation of the forces of nature under fixed conditions. This is the foundation underlying physical therapy. Empiricism should never and need never be a guide in any of our procedures.

While the whole field of natural laws may perhaps never be fully explored and formulated, there can be no question that at this time we are in possession of accurate knowledge of the most important forces, covering not alone their nature, but their mathematics as well. Anatomical and physiological knowledge including animal chemistry has in many respects also developed to a very advanced position. We must from the nature of our work be alert to utilize every atom of information in these departments of our equipment. On the other hand the benefits of knowledge derived from the study of cellular pathology, at least to the therapist, have never become apparent. At least this must be admitted to be true up to the present. On the contrary the findings are liable to befog the mind of the investigator, for a very simple reason, that is because the record of the cells is a record of the results of processes; whereas the requirements of the therapist are for a knowledge of operating and active processes. The physician

is interested in life and that which concerns it, the knowledge of a wreck and its minute facts are perhaps historically interesting but rarely practically useful. Therefore while we may say that cellular pathology is beautiful as an academic study, we can equally say it is useless and befogging to the therapist.

It is inconceivable that a normal being under correct conditions should deviate from a state of health. A great portion of our work therefore is the study of what constitutes correct conditions, not alone of the environment but of the individual also. This is the field in which we must labor assiduously. The knowledge acquired and the conceptions we form here determine our success or our failure as physicians.

Changes in the tissues are always relatively developed as compared with their physiological state. Our estimate of the amount of change should always be based upon the capacity to perform function, never upon the microscopic cellular condition. The first is the living evidence, the latter the dead record. For example, the study of glandular efficiency or other work performed by the tissues is always a true guide to existent conditions, a true means of determining the vital power in the part or parts concerned. This method of observation is practical since the information secured is an accurate guide in prophylaxis, prognosis, and in therapeutics.

We must agree that every compensatory and reparative effort or process arises from forces existing within the living economy. Our measures can but aid in controlling the efficiency of these automatic adjusting activities by re-inforcing deficiencies of action or by hindering over-action. We must in consequence grasp the enormous importance of the fact that every action of the economy against a cause is a portion of the reparative or compensatory effort, and we must invariably be perfectly clear in our mind, that we are acting in conformity with the particular result which natural forces are endeavoring to accomplish.

The forces acting upon the organism come first from within, secondly from without, and third partly from within and without.

I. From within, the intrinsic forces; these are either general or local.

The general forces arising within the body acting repara-

tively or compensatorily are either febrile or glandular activity. These activities stand always in an inverse ratio to one another, in any individual and at any time in the history of an existent condition. High fever invariably existing with low glandular action, and again the absence of febrile action with high glandular secretion and excretion. Through secretion and excretion there is secured elimination of toxins or the compensation which removes irritation or its results. It is a part of our duty to observe the manner in which the economy reacts, so that when the *vis medicatrix naturæ* is incapable of uniform reaction, to so apply our physical measures that the desired result is accomplished. Utilizing every emunctory channel for the desired result, and not relying upon any one to the exclusion of the others. Assuaging and cooling the overheated parts, and congesting those whose activities are impaired from insufficient blood supply. Hydrotherapy here asserting its great claims. Where a good reaction does not promptly occur to a chill that is ushering in a febrile process, the employment of thermotherapy to unload internal congestions and fill the anemic surface, will invariably prove satisfactory. Moist or dry procedures being efficient, the moist however being more easily applied and preferable. As soon as the blood current has been equally saturated with the toxic matters, active measures to unload these substances must be initiated. For the skin the sheet pack, for the intestines enemata, the kidneys are already supplied with high vascular pressure from the nature of the reaction secured and therefore rarely require aid, inasmuch as the urinary secretion in these conditions is invariably of high specific gravity, showing very efficient glandular action. The purest of air at all times to favor oxidation and facilitate the normal interchange of gases in the pulmonary air vesicles, as well as for the purpose of maintaining a high degree of vitalization through a maximum of oxyhemoglobin production and diffusion. The use of the hip bath for the purpose of warding off the crippling effect of pyrexia upon the nerves and cells of the abdominal glandular mechanism and the muscular apparatus as well. In other words, maintaining and aiding the excretory efforts by positive yet harmless physical measures. A dietetic regimen in conformity with the digestive powers. Experience has shown amply that in acute general conditions that portion of the economy is in a dormant condi-

tion. The feeling and instinct of the patient in practically all such cases is the same. This instinct being so uniformly constant must be true and is one of the safeguards to the individual. In the absence of glandular action, how absurd is the method of hyperalimentation at such times? How many patients are thus deprived of the benefit of the reparative effort involved in their febrile process?

The instincts of the patient are to be observed and respected. Steps taken against the instinct of the patient must never be taken without careful consideration and for good and sufficient reason. In all events avoiding the use of benumbing or paralyzing agents, including in this category the protracted employment of low temperature treatments, externally or internally.

Heralding with gratification the production of secretions and excretions through whatever channels the activities of the patient has prepared them. Invariably avoiding meddlesome medication which interposes numerous complexities by altering the natural progress and process of reaction, and which steps also disturb the functional inter-relations, thermic conditions, and metabolic activities. In essence and practically developing a tendency and probability of localizing the general reactionary state upon a part, thus producing local disease.

One can make the assertion with safety that an acute general reactionary fever which is running a normal course is never the cause of local disease, unless the economy is incompetent to carry out the effort of nature. Local disease however always results when the general reaction is incompetent through 1, lack of innate vigor in the individual; 2, through abnormal environment; or 3, through meddlesome or incompetent therapy.

The local conditions developed as a consequence of ineffectual general reaction, necessarily bear a relation in their intensity to the activity of the disturbed general reaction; quantitatively as also qualitatively. We cannot recognize the reaction of a single set of organs as a general reaction, although we can think of a nervous system, a muscular system and the like. The only organs which participate as a factor in general reactions for therapeutic purposes are the blood and the eliminatory organs. No organs or sets of organs have an existence apart from the others, however general may be the

phenomena which are present, therefore we must properly appraise the relative importance and significance of local symptoms as connected to the general condition.

The intrinsic local reactions may be of any degree of intensity; and in any cell or set of cells, any simple organ or sets of organs.

II. The extrinsic actions on the organism are psychical and physical.

The psychical actions from without are the impressions made through the various sensory mechanisms and the thoughts conveyed to the cerebrum.

The extrinsic physical conditions, acting upon the organism, may be either through the medium of force or through matter or both. The enumeration of the forces acting from without is unnecessary excepting to recall the fact that the intensity and duration of their action are matters of importance, and that there are certain unknown atmospheric and telluric conditions which have been assumed to have more or less importance in this connection, also the knowledge that many material substances are foreign to the body chemically. To these bodies the organism can never be a normal host, whether they are indifferent in their action upon the tissues or whether they act as a poison directly or indirectly. Similarly we can speak of normal and abnormal forces, and just as aptly of normal and abnormal psychical impressions.

III. The forces acting partly from without and partly from within are all the external psychical conditions, forces or matter capable of producing reaction on the part of the body. Their number and kind are infinite. They embrace the universe of mind, force and matter. They may act beneficently, indifferently or injuriously; and any of these actions and reactions may be of any degree or for varying lengths of time.

Having considered the elements involved in the reactionary conditions, we are prepared to discuss the subject it leads to, the question of greatest importance to us.

"WHAT ARE NORMAL REACTIONS."

The answer to this question is of the deepest significance to us, since its answer reaches as far as the basis of organic life, and constitutes the corner stone as well as foundation of our entire work as physicians.

Primarily the simplest form of life defines the question perfectly, for a generic answer. Specifically, however, physiology alone can answer our question.

We can confidently assert that every un-physiological condition is an abnormal state or its result.

For necessarily every abnormal stimulus causes an abnormal reaction. Not every abnormal reaction is necessarily of a serious nature. The persistence of abnormal reactions is however injurious or destructive to a greater or lesser degree. The very stimuli which are normal can through their quantity, quality or time of action be abnormal, even destructive. We can enumerate food, heat, light, movement, metabolism, all manifestations of radiant energy and climatic or telluric conditions as examples. The introduction into the economy of elements or compounds not normally present or substances which the body cannot utilize or again completely or successfully remove without immediate or remote damage, are further examples.

Our environment has placed us in contact with matter and forces which have acted normally upon all living matter since life began. These are the normal stimuli—air, heat, light, sound, electricity, food, and the like. These natural stimuli are the physical agents at our command; measurable, controllable, producing their results inevitably and invariably the same, when used in conformity with physical laws. A reaction being produced from the acting cause in the manner and quantity predicated, when intelligently applied.

The study of the abnormal reactions is important on account of the necessity of understanding thoroughly the causes that induced them and the reasons for the particular form of reaction assumed. Aside from trauma and extrinsic poisons and contagium, this study embraces mainly the disturbed nutrition of the body and the action of the autogenous toxins upon the tissues, as also the reaction of the tissues to these several causes. Essentially and mainly however the toxin contest will be the ever present problem in all conditions, because clinically it is never absent in the sick.

Primarily comes the study of intra-systemic toxin production, and dietetic conditions quantitative and qualitative necessary for their evolution in a given case beyond the capacity of the individual to successfully eliminate. This study and the

information acquired gives the data necessary for prophylactic advice and the consequent measures for healing the patient. The reaction of the tissues to the toxins explains many general and local diseases by a more thorough appreciation of the organic processes discovered as a result of close investigation. The study of the thermic condition is a portion of the preceding as is also the investigation of the blood. Each of these will be found to be necessary.

Specifically the necessity for the recognition of the bilirubin, biliverdin, xanthin, etc., is essential. The excess of fluid in the blood and tissues, with the accompanying dilution of the red blood corpuscles per definite volume, must be determined, thus showing that the apparent corpuscular anemia is in truth a hydremia, a plasma dilution. The hemoglobin reduction always found in these cases being due to the destructive action of water on the red blood corpuscle, detectable invariably by black spotting of the erythrocyte, and separation into the plasma of floating pigment. The deposition of the separated pigment causing many of the discolorations and melanotic conditions we have all of us observed. The absence of the necessary organic sodium salts from the plasma also requires investigation, since the carbonic-acidæmia consequent upon this deficiency is a destructive and protean general process.

The examination of the quantitative presence of the potash salts in the plasma and tissues is of great importance. The manifestations due to these several substances, generally or locally, and the recognition of the convulsive action of the bilirubin, water and potash salts should be ever in our mind. The stupefying and paralyzing action of biliverdin and the exhaustion from the varying degrees of carbon dioxide poisoning are equally matters requiring our vigilance.

The importance of realizing that since we recognize the possible variations of blood supply to different parts of the body so also we must know the great differences in body temperature that one can continually demonstrate when making simultaneous thermometric observations at different points.

We must acquaint ourselves with the peculiar state of the muscular apparatus, and many will be surprised at the rigidity of a single muscle or groups of muscles in all patients suffering from weariness and soreness of extremities or trunk. We

must in these persons investigate the condition of the nerve trunks as also the spinal branches of the cord.

In our work we must keep systematic records of rectal temperatures, for while giving treatment to a local toxemic condition, general febrile reaction is always a possibility. The temperature chart however is an inevitable guide to the degree of toxicity of the blood, and this also shows the importance of close records of the fecal elimination, as to quantity, color, consistence and other essential particulars.

The local treatment, which unloads the deposited materies morbi into the blood, secures its measure of relief and the blood in turn frees itself by the action of the emunctories. This is the unending chain for such conditions. If in our haste to relieve a local condition, we have overstepped the limits which the eliminatory apparatus has placed by reason of its capacity, the storm which is sure to break will be proportionate to our lack of prudence. The phenomena developing will be a more or less marked chill with consequent fever, bearing direct relation in intensity to the chill which ushered in the reactionary condition. If elimination in proper quantity and quality is secured, prompt subsidence of the condition occurs; on the other hand if moderate or no elimination is developed the usual run of febrile conditions with all the attendant sequelæ follows. Occasionally of course sufficient of the toxic material passes into the lymph channels and a reactionary lymphangitis or lymphadenitis is developed.

The stasis which is a part of tender muscles in a state of semi spasm is readily relieved by a variety of measures, when however the eliminatory apparatus is relatively inefficient, fever will inevitably occur from the relief of the local condition. So also the successful unloading of any considerable chronic congestion under similar conditions would necessarily produce febrile reaction.

Under such circumstances the writer believes the febrile state to be due to a direct reaction of the blood as a whole against its toxic guest. The whole reaction is necessarily beneficial when running a normal course. Injurious and dangerous where all the proper and necessary actions are not secured.

We must give adequate attention to the rôle played by the distribution of nervous energy in all of our work; in the same

connection as in the discussion of muscle semi spasm, above mentioned as tender muscles. This is a very common condition and is invariably associated with the feeling subjectively of weariness or aching. The explanation of the aching is found at once upon palpation of the muscles—they are “sore,” “tender” or “bruised” according to the patient. The cause of the sense of weariness is also obvious. The persistent maintenance of muscular contraction is a drain upon the motor energy of the nervous system. The quantity of nervous energy used in this way being dependent upon the amount of muscular spasm as well as the number of muscles involved.

The relief of this spasm causes an immediate sense of elasticity and buoyancy with general exhilaration. Obviously because the local state is relieved and the drain on the nervous system has ceased.

The causative agents may have been one or more of the several possible ones and the muscular condition may have been primary or secondary to a toxic condition in the spinal cord, motor nerve, or muscle itself. I have entered into a somewhat detailed discussion of this one condition, on account of the importance of impressing upon all, the relationship of the local condition to the general reaction, and illustrating it concretely.

Furthermore to show how easily in some conditions general reaction could be secured, as well as the real position occupied by our local treatments.

Let us depart for a moment from our direct line for a thought which will be of aid to us in making each one a keener observer and a more careful recorder of facts.

No medical man has in all likelihood ever seen a patient in whom he could discern the complete and classical picture of a disease, as described in the usual text books. Variations, additional symptoms, absence of symptoms, all render the clinical picture one that compels a strained interpretation; therefore an untrue one. Supposing that the condition has been correctly catalogued according to the principles of the accepted art; are we aided in any way to a rational therapy in consequence of such classification?

Fictitious classifications in which so-called cases are forced, are the stumbling blocks to the development of independent powers of observation, and a cause for ignoring phenomena

unprovided for in the academic manner. The patient being necessarily always the main sufferer.

Action and reaction are direct, certain and infallible guides for all our purposes. If in addition we conceive of local and general reactions we are completely the masters. Our choice of measures becomes clear. The quantity and quality are determined by that which we wish to accomplish. We cease to be wedded to any single measure or group of measures. Accuracy and method are inevitable and our art becomes a source of pleasure and of pride.

From this point of view we do not cure, we heal. We arouse or mitigate reactions, we arouse general reaction to local conditions, we remove the hindrances to glandular activity by cooling the overheated tissue or its nerve supply, or we continuously apply moisture to desiccated mucous membrane or skin, which by osmosis overcomes this physical impediment to glandular action. We employ the continuous current negatively to aid in securing moisture and a full blood supply, or we employ heat or again use vacuum by removing atmospheric pressure, for the same purpose; perhaps we apply posture to secure the action of gravity with a similar purpose in view or even static sparks. In fact any physical agency fitted to the purposes and leading to the result desired. The particular agent is never of so much consequence as is the attainment of the desired result in the proper degree and time, but always in the most innocuous manner.

From a somewhat extended experience the writer is convinced that many local conditions are distinctly removable through local glandular action or through general reaction.

It is obvious that in theory at least all conditions should be curable if a sufficiently intense general reactionary state could be secured. Unfortunately those who suffer from advanced degenerative or organic disease are not physically able to compensate to the proper degree nor furthermore is their glandular apparatus efficient to the required degree. Boldness therefore is to be guided by reason. Fractional reactions being the only resource under such conditions. That is the guarded development of mild degrees of fever with a full subsidence of general activity before endeavoring to attain another febrile response.

Through these measures lie innumerable untested therapeutic possibilities. No condition need be hopeless in the

presence of the proper vigor in the patient and the result will be attained through compensation, adjustment or reactionary obliteration of the abnormal condition.

Let us be the pioneers in the establishment of a true science and art of therapy. Let ours be the hands that will elevate our work into the position of an exact and true profession. Let us remove the present opprobrium as applied to those who combat disease with experimental and uncertain agents. Let us treat sick beings according to their physiological requirements, and apply ourselves to the study of nature's method of self-repair or readjustment and possessed with the true spirit of approaching every patient with the thought that our duty is to instruct and guide them, which would be inseparably linked with the technical application of all measures lying within the sphere of our special work.

Finally to see how simply and naturally we can attain our results, always avoiding the choice of uncertain, empirical or dangerous experiments.

Those who observe accurately, think clearly and are unbiassed cannot fail to secure the best attainable results, in physical therapy.

The writer believes that the importance of these matters is so great that he is warranted in recommending to the society the creation of a standing committee. That this committee shall present its work to the association in an annual report. Essentially being a brief review of facts, reasons and measures. That this committee shall study the sick with reference to the several reactionary conditions. My suggestion would be that the committee be named: Committee for the study of reactionary abnormal conditions in man, both general and local.

I should furthermore urge the importance of having our scientific committees devote their attention more particularly to measures and principles. The importance of annual reports on improvements and new devices in apparatus is great but not so important as new principles or the elucidation of old principles.

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ELECTRICITY AS A FACTOR IN THE TREATMENT OF DISEASES OF THE NERVOUS SYSTEM.

BY FRANCIS B. BISHOP, M. D., WASHINGTON, D. C.

Electricity may be said to exercise its influence upon the body by its action upon protoplasm, either directly or indirectly modifying metabolism. Weak currents stimulate ameboid movement, while strong currents cause the cells to assume a spherical form and to become motionless. The destructive metabolism of a cell is increased by its activity, but goes on also during quiescence. In protoplasm the two processes of waste and repair go on side by side, and as long as they are equal the size of the animal remains stationary. If, however, the building up exceed the waste the animal grows; if the waste exceed the repair the animal decays, and if decay go on beyond a certain point life becomes impossible.

It is an established fact that by its action directly upon the protoplasm of the nerves and muscles, the continuous current (interrupted) will cause to contract muscles when they will no longer respond to the normal volitional efferent impulse, or to the induced current. It is also a fact that the induced current will produce normally a more vigorous and prolonged contraction than the continuous current. It is equally true that when the motor neurons are cut off from their peripheral terminations, the anabolic action of the positive pole of the continuous current will produce contraction when neither the catabolic action of the negative pole or the induced current will produce such contraction.

From long and careful observation I have been led to believe that the effects of the various currents upon the tissues of the body, are those of anabolism, catabolism, and metabolism according to the polarity, strength, and direction of the current used in relation to the tissues treated. In the physiological experiments upon the heart it has been shown in the electrical phenomena that during its contraction a distinct electrical change occurs, which is similar to that which happens in skeletal muscles with each contraction. It has been demonstrated that a stannuized frog heart undergoes two changes as regards its electrical condition; the first, immediately before the contraction, in which the excited part becomes negative to the other parts, contraction following the wave of excitation.

and the second, during relaxation, in which the current flows in an opposite direction. According to the views of Gaskell, the heart-muscle, as in protoplasm generally, the metabolic processes are those of anabolism, or building up, which takes place during the diastole of the heart, that vagus stimulation helps on this process, and of catabolism, or discharge, which is manifested in the contraction of the heart, and which is accelerated by stimulation of the sympathetic fibers; that vagus stimulation is therefore ultimately beneficial to the contractions. The electrical currents set up on the stimulation of the vagus and of the sympathetic are in opposite directions, and so, if Gaskell's contention is correct, that the negative variation of the muscle current occurring on sympathetic stimulation is a sign of catabolism. The result of vagus stimulation, viz., a positive variation of the muscle current, may be supposed to indicate the complementary condition of anabolism (Kirk).

According to the theory of Sir Oliver Lodge, all matter is electricity, varying in its density, vibration, and function according to the number of electrons in each atom and that the electrons in the atom are always in a state of great activity and are held in the atom only by the attractive power of the positive ions. In the excited x-ray tube the cathode stream of electrical negative particles travel in an absolutely straight line from the negative pole to the target or anticathode at the rate of about 20,000 miles per second, while the positive particles or ions, which are much larger, travel more slowly, and creep, as it were, around the sides of the tube and up behind the cathode. This is not only the case with the vacuum tube but may be in a measure demonstrated between the discharging rods of a static machine in action. The white spark issuing from the negative pole, when the discharging rods are separated six to eight inches, will travel straight for the positive pole barring the deflection by atmospheric wave pressure, and surrounding objects. The white sparks from the negative side are composed of waves of the higher frequencies. While the colored sparks coming from the positive pole are composed of waves of the lower frequencies and seem to surround the white sparks and bulge out to come together cone-shaped at the sides of the negative sliding rod ball. This same law or principle should hold good in all currents including

nerve currents and muscle currents. This Lodge theory gives a new meaning and a new importance to the terms "positive" and "negative" as applied in electro-therapeutics. The fact that a normal motor nerve will react to the negative continuous current, applied anywhere along its trunk, and as a result of such reaction will perform its normal function of producing contraction in the muscles to which it is distributed, suggests, at least that the same rate of vibration has been transmitted to the nerve by the battery current as is usually transmitted by the motor cells of the cerebral cortex through the volitional paths to the motor nerves. We can understand why muscles contract more vigorously as a rule under the influence of the induced current than under the continuous, for by its irritating qualities it contracts muscles largely by its influence on the superficial sensory nerves; therefore we get a reflex action or stimulation through the afferent impulse being converted into a motor action, and when this is the case the contractions are usually more vigorous and prolonged than when due to direct motor stimulation; but why a degenerate muscle and nerve will often react more readily to the positive pole of the continuous current or, to put it more accurately, to the A. C. C. than the C. C. C. has never to my knowledge been satisfactorily explained. One explanation is that the continuous current causes contraction in the muscles supplied by a degenerate nerve by its action directly upon the muscle protoplasm; but this does not explain why the positive pole has this action, frequently exclusively, as the negative pole of the continuous current will often fail to cause contractions in degeneration. One may assume, as an explanation, that when a muscle is cut off from its central nerve supply that it loses the stimulus that produces the negative electrical variation so necessary to normal muscular contraction, and in order that this negative variation may be induced the muscle must be subjected to a positive interrupted discharge of the continuous current. Again, assuming the electron theory to be correct, it may be that the motor nerve deprived for the time of the normal rate of vibration from the controlling neuron finds its vibration more in harmony with the slower and more widely distributed positive ions and consequently responds to the latter stimulus.

We know that degenerate nerves and muscles are more susceptible to the influence of the positive continuous current, and

we have seen that the positive current or positive variation is associated with anabolism, and in this condition we need a great deal of anabolism and to avoid catabolism as far as possible. The positive stable current should be applied very mildly without the slightest interruption as we must avoid contractions for a while as contractions produce fatigue and fatigue is conducive to destructive metabolism of the protoplasmic cell. As regeneration progresses contractions may and indeed, need to be produced very gently and for a short time only, at first with a period of perfect rest between each contraction. In the treatment of degenerate muscles with the positive continuous current, we fill two important physiological requirements. A muscle in a state of complete and continuous relaxation is alkaline in reaction and is poorly supplied with oxygen. The positive current attracts to its pole acids and oxygen, thus neutralizing the alkaline reaction of the muscle and bringing oxygen to aid in the building up of the muscle and nerve protoplasmic cells. The relaxed and alkaline muscle, being attacked by the closing or opening positive acid pole, may also account for the more ready reaction of the degenerate muscle to the positive current.

The action of the electric current upon the pneumogastric nerve is a subject worthy of the most profound study and careful experimentation. Under the influence of the very wide distribution of this nerve do we find the most important vital organs of the body. Stimulation will generally increase its inhibitory action upon the heart and will cause inspiration when the lungs are empty, as well as expiration when the lungs are full of air. It is a very important motor nerve of the stomach and intestines, its stimulation will cause gentle motion of these organs. It influences the action of the liver, the kidneys, and the spleen, but from the standpoint of our present knowledge the most important action in connection with electrotherapeutics is its anabolic action upon the heart muscle. It has been my good fortune to see a weak, diseased, and irregular heart in the person of an old lady over seventy years of age go on functioning very comfortably for several years without the aid of drugs by the careful electrical stimulation of the pneumogastriacs, together with the peripheral stimulation and ozone inhalations from the static convective discharge. I have seen the tumultuous action of the heart in exophthalmic goiter

quiet down and the beats regulated, not once, but time and again, by the proper stimulation of the pneumogastrics. Owing to its seemingly quicker action and more directly penetrating quality I have usually preferred the negative pole in the latter cases applied over the nerves; sometimes I have resorted to the interrupted direct current, very carefully watching its effects. The study of the various currents and their modification upon the pneumogastrics alone could consume the working hours of a long life, and fill a very large volume. The sympathetic ganglia and nerves are much harder to reach and influence than the pneumogastrics, as they lie deeper in the neck and require more current to affect them, and less is really known as to the real value of their stimulation. But as their ganglion cells and axis-cylinders are composed of protoplasm, they must follow the same rules as to the effects of stimulation by the electric current as other protoplasm; but as they are catabolic in their action upon stimulation, and as they supply the muscles of the blood-vessels and of the viscera, we must be sure of the action we most desire, whether we wish to inhibit or accelerate their action, and then use the rule laid down. Weak currents stimulate the protoplasmic cells and increase their activity, while strong currents cause them to assume a spherical form and become motionless. The sympathetics may be reached through their ganglia in the neck, trying very carefully to avoid the pneumogastrics. They may be reached through the bowels and the dorsal spine, or the bowels and the epigastrium.

Physiologists tell us, and indeed our daily observations confirm the statement, that one of the chief functions of nerve cells appears to be the power of sending out impulses to the periphery along efferent nerves in response to impulses reaching them through afferent nerves, and that an impulse passing to a nerve cell may produce such a change in its metabolism that a discharge of energy ensues, and as it passes out as an efferent impulse it produces a change in the peripheral end of the efferent nerves which impulse may be to induce motion, secretion, nutrition, or vasomotor.

To the electro-therapeutist this is most important knowledge. His applications must of necessity be topical, and through the impressions made upon the peripheral endings of the afferent nerves he can reach the centers controlling motion, secretion,

nutrition, and the functions of the vasomotor nerves. A current applied to the back in the region of the kidneys will cause an increase in the secretion of urine, will dilate the peripheral blood-vessels. If strong enough and interrupted, will cause contraction of the muscles of the back and a sense of burning under the sponge—all due to a reflex stimulation of the nerve centers controlling this region and a change in the metabolism. Again, afferent impulses in acting upon the central neurons may produce inhibitory influences and any center is susceptible to this action. It is through this action that we relieve a localized pain, a muscular spasm, or an excited heart. In relieving neuralgias the same principle is involved. Gentle pressure applied to protoplasm increases its movements, therefore when a nerve is pressed on by inflammatory or other lesions, if it be a sensory nerve, the pain results in a motor nerve spasm; but if the pressure is great and continuous, destructive metabolism takes place in the nerve and we have loss of sensation or paralysis of motion or both. Here we need the catabolic action of the negative continuous current, if the lesion can be located to destroy by cataphoric action or dissipate the lesion. In neuralgia, and in neuritis from toxic causes, after the toxic material has ceased its action, the pain will often continue, due to the metabolic change produced upon the protoplasm of the nerve cells. Here we need a current carefully regulated, whose rate of vibration will act in harmony with that of the normal nerve impulse; when this is reached, we may relieve the pain and by a repetition of this treatment at regular intervals, the nutrition of the neuron will be restored and the normal nerve current resumed. Pain or spasm may result from some central irritation of a toxic nature without producing neuritis; here the treatment will be the same, the object being to cause a normal reaction in the protoplasm of the central gray matter. In cases of localized numbness, when we can find no special cause, and which is called tropho-neurosis, that may be due to congestion of the terminal filaments; of the sensory nerves or spasms of the arterioles in the skin; in either event I have always believed these cases to be due to a toxic influence upon the nerve centers, inhibiting their normal action. Here the positive continuous current has given me the best results and follows the law that an electrical current flowing in the direction of a nerve current increases

the action. As the negative current is the normal for motor nerve reaction, it seems to me that the positive is the normal for sensory nerve reaction. This claim, I think, can be readily demonstrated upon the nerves of special sense.

In deep-seated neuralgias and neuritis the continuous current has been my sheet anchor. In neuritis of the superficial nerves I use the negative static oscillatory current from the negative side *only* (same law as above), the positive side being grounded and the vibrations graduated until the pain is lulled. I then think that my vibration is in harmony with the normal flow and that the central neurons are being aided in their effort to resume normal action. I allow this oscillatory current to pass until the patient is quite comfortable.

"From various considerations it is certain that pain is always the result of a change in the nerve cells of the brain." Now as nerve cells are protoplasm, and as the nerves are merely continuations of the nerve cells, they are also protoplasm and must be subject to the law that governs the action of protoplasm under the influence of the electrical discharge; and as the activity of all matter is due to vibration and as the character of the vibration is due (according to Lodge) to the number of electrons in each atom, and as these electrons are constantly in motion and kept within the atom only by the attractive power of the positive ions, one may readily conceive abnormal sensation to be due to a modification of the electrical equilibrium in the nerve cells or a lack of ionic control of the electrons, and normal sensation to be due to a more or less continuous flow of afferent impulses harmoniously blended; and when this harmony is disturbed, abnormal sensation results. It may be pain, it may be numbness, it may be itching, it may be formication, it may be a burning sensation. In any event, barring traumatic or other lesions, we are liable to cure our patients if we can regulate our current in such a way as to send through these afferent nerves a vibration of such character and rate as to create a nutritive action in the protoplasm of the cells of the brain and spinal cord. In some cases of organic lesions of the spinal cord, where the condition of the patient has seemed hopeless, I have, by the use of the electric current alone, favorably influenced the progress of the disease to such an extent as to render the patients comfortable and able to take care of themselves.

It has been pretty conclusively shown that all nerves are of the same anatomical construction and that they differ in their function only in consequence of the difference of function in their end organs, which for convenience we will call sensory and motor. The same is true of all battery currents whose conductors differ only in consequence of the difference in function of their poles, which for convenience we call positive and negative. Our electric conductors are insulated to prevent loss of current by contact with extraneous objects. The axis-cylinder or conducting material of each nerve, as it is continued from the neuron in the brain, the anterior cornu, the posterior spinal ganglion, is carefully surrounded by its insulating material so that each nerve cell may transmit its own peculiar impulse to its destination without loss by contact with the surrounding tissue. So it seems that each and every central ganglion cell resembles a minute electric battery receiving from the periphery impressions which are interpreted by each organ according to its function, and is transmitted as an impulse to sensory, motor, or secretory, nutritive, or vasomotor. Is it not possible that these nerve impulses are really electrical, at any rate when the circuit is disturbed either in the cell or nerve fiber? Normal impulses are no longer possible; and in many instances the properly selected electrical current, in consequence of its immediate action upon protoplasm, will do more to restore the perfect communication between center and periphery than at present, any known agent, provided, of course, there is not a decided break in the circuit in consequence of some inflammatory lesion, and even then, if the lesion can be located, the catalytic action of the current will often remove the lesion, unless it is of a destructive nature and has already destroyed tissue. In functional disease of the nervous system, the general metabolic processes are sadly at fault. The chief seat of nervous metabolism is said to be in the axis-cylinder, which is merely a continuation of the neuron substance. When the metabolism is disturbed, be it from too prolonged and strenuous mental labor, be it from the exhausting effects of acute disease or from prolonged or improper diet, eating too much or too little, or from many other causes, serious functional nervous diseases are apt to be manifested. The metabolism of the brain cells is often disturbed in consequence of a blood supply, either insufficient in itself or insufficient in the

amount of nourishment supplied to the protoplasm of the cells; or again the supply and nourishing quality may be sufficient, but so charged with toxins as to modify and obtund the normal activity of the cells. The result of this impoverished metabolism may manifest itself in various ways,—in so-called neurasthenia, in lowered blood pressure, high blood pressure, in hysteria, and in many ways showing a general metabolic nerve cell disturbance. The Weir-Mitchell cure for neurasthenia may do very well for a small proportion of cases, but what is needed in all is a well-selected diet and a treatment which will create by gentle reflex stimulation normal activity in these protoplasmic masses throughout the entire nervous system. One method which in my hands has been very useful, is the static current applied in the following manner: The patient is placed reclining upon a couch or operating chair and is attached to the appropriate side of a good static machine. The static canopy is lowered over him until, according to my judgment, he is in the midst of the electro-static field, the machine is started with sliding rods well separated. A pleasant breeze surrounds the patient, charged with ozone. This he is instructed to breathe, deeply and regularly. The entire body is brought in contact with a very high-tension discharge, smoothly and pleasantly stimulating gently the entire surface of the body. This stimulation acting upon the end brushes and sensory corpuscles of the afferent nerves is transmitted to the ganglion cells from every portion of the body, while the ozone is rendered unirritating by its mixture with the atmospheric air, and we know that oxygen is immediately absorbed into the blood and is very necessary to the perfect metabolism of the tissues. I have cured many neurasthenics by this method, with the aid of other currents used for special reasons in different cases. It has been my pleasure lately to see one of my very dear friends relieved not once, but many times, from a most intense gouty headache with high blood pressure, by an immersion for fifteen minutes at a time in this electro-static field; and a treatment every day for about two months has placed him in a position to resume with interest his vocation, filled as it is with many cares and great responsibilities.

In conclusion, I wish to state that the claims made in this paper as to the action of electricity are founded upon physiological facts and that I have borrowed freely from Kirk's "Physiology." Whether all or any of these claims will stand the test of time and further experience I do not pretend to say, but I do know that in electricity we have one of the most powerful agents for good when properly and carefully administered to suit the cases as they are presented; and conversely, a most powerful agent for harm when carelessly used; and that all real progress must be made upon the foundation of a carefully constructed electro-physiology.

CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

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CHAPTER II

(Continued from page 460.)

The type of the cell that forms the carcinoma depends upon the variety from which it grew. In the squamous epitheliomata the cells resemble those of the squamous variety, such as are found covering the skin. The cells are large and flat, with a large vesicular and centrally located nucleus.

In those arising from the glandular mucous membranes and from the glandular organs the cells are usually columnar or cuboidal.

It was formerly thought by some investigators that the diagnosis of malignancy could be made from the cells alone on account of their atypical appearance. Such, however, is not the case, the abnormalities of the shape and size of the cells being accidental conditions, resulting probably from the compression brought about by the growth of the tumor.

The diagnosis of malignancy depends rather on the general relation of the tissues than upon individual characteristics of the cells.

Normally, in an acinus of a gland the epithelial cells generally occur in a single layer resting upon a very thin but well-formed basement membrane of adult connective tissue that separates them from the surrounding tissues. In a so-called adeno-carcinoma the cells are found to have done either or both of two things. They may have undergone such a proliferation as to have more or less completely filled up the acinus.

(These epithelial tumors are frequently classified as Simple, Scirrhus, and Medullary, according as to whether the amounts of epithelium and connective tissue are about equal, or the former or latter elements predominate.) In such a condition instead of a single layer of uniform cells there will be many layers of atypical ones.

On the one hand, the basement membrane may have succumbed to the malignant effects and the cells will have invaded the surrounding tissues. According to the plane of the section examined, there may be found these masses of atypical cells isolated from any acinus, or the point of rupture through the basement membrane may be disclosed.

In the so-called epitheliomata the papillæ of the skin will be found to extend deeply into the underlying tissues. The restraining power governing the growth of the cells is apparently destroyed and the epithelium infiltrates the surrounding structures. In many places the cells will be found concentrically arranged, forming the epithelial pearls. In these areas the cells will frequently have undergone a transformation into keratin.

It should be remembered, however, that these pearls do not indicate malignancy; they show nothing more than that the particular growth arose from squamous epithelium. Carcinomata, having grown to some size, very commonly show various forms of degeneration, the most frequent being a fatty change. Like all other epithelial structures, a parenchymatous degeneration of the cells is often found. The protoplasm will be swollen and cloudy, and the nuclei may be very indistinct or even completely concealed.

The connective tissue present may undergo a myxomatous change and give rise to the so-called colloid cancer, an incorrect definition, as the change is not within the epithelium but within the fibrous stroma.

Occasionally the cancer may become cystic, either by a blocking up or absence of an excretory duct, or by degeneration of the growth itself.

There may be a deposit of lime salts within the degenerated areas.

There may also be secondary inflammatory changes, brought about by the infection of the tumor by some organism, particularly the streptococcus or staphylococcus. The sarcomata, or malignant mesoblastic tumors, are composed of tissue that in its form resembles to a certain extent embryonal connective tissue. It, however, differs from it in that in the sarcoma the cells never attain an adult condition, and they do not all originate as round cells, as do normal varieties of connective tissue. The growth may be composed from its earliest stages of spindle

cells and not show any attempt at true connective tissue formation, no matter how long the tumor might exist.

A sarcoma is generally more circumscribed and nodular than a carcinoma, and is frequently decidedly pinkish in color on account of the amount of blood present. It may vary in hardness, depending upon the amount of intercellular substance present. It may become soft through degenerative changes.

These tumors may arise wherever there is a pre-existing connective tissue. Consequently they may be found in any part of the body, externally, or within the internal organs.

The microscopic examination shows why metastasis in the sarcoma takes place by means of the blood vessels. The tumor is made up of undeveloped connective tissue, and the blood vessels, instead of having well-formed walls, have usually a single layer of flat endothelial cells. Even this slight protection is often absent, the endothelium being present in a very imperfect condition. Consequently the blood channel is often surrounded by nothing more than a mass of tumor cells. As a result of this, very slight degenerative changes in the tumor allow the cells to be set free within the circulation. They are then carried to the small capillaries, in which they lodge and grow.

In carcinomata, on the other hand, the connective tissue that is present in varying amounts between the collections of atypical epithelial cells is fully developed, and it is there that the blood vessels are found. They are thus separated from intimate contact with the tumor cells, and consequently metastasis of carcinoma by the blood is comparatively rare.

In sarcoma there is little or no tendency towards fibrous tissue formation. There is, however, a great multiplication and increase in the number of cellular elements.

According to the variety of cell, the sarcoma may belong to one of the following types: Round cell, spindle cell, or giant cell. It may be known as an angio-sarcoma if it has had its origin from the adventitia of the blood vessels, or it may be a melanotic sarcoma if pigment in the form of melanin is present. This pigment differs from the coloring matter of the blood in that it does not contain iron. The round-cell sarcoma is composed of cells that may be either large or small. In them there is very little intercellular substance, the cells greatly pre-

dominating. They are grayish or pinkish in color, and frequently exude a milky fluid. They are always malignant, and the smaller the cell the more marked is the predisposition to general involvement.

The spindle-cell form may also be divided into large or small according to the size of the cell present. They are usually comparatively firm, and sometimes the intercellular substance is so well marked that the tumor may be called a fibrosarcoma. At times it is very difficult to decide whether or not the tumor is sarcomatous or fibrous. As a rule, they are not very malignant; quite frequently they do not give metastasis.

The giant-cell sarcoma usually arises from the periosteal covering, and gets its name from the fact that in it we find many cells containing two or more nuclei. Incidentally, it should be remembered that the term giant cell wherever met with does not refer to the size of the cell; it indicates only that there are more than one nucleus. These tumors are slow in growth, usually quite hard, and are practically benign, very seldom giving rise to metastasis.

The angio-sarcoma is seen to consist of irregular masses of cells surrounding blood vessels. They frequently undergo a myxomatous degeneration, and hemorrhage into the surrounding tissues may result. As a general rule, they do not tend to give metastasis.

The melanotic sarcoma is one that may be made up of cells of any variety and of any arrangement, but it contains melanin. This coloring matter may occur either within or between the cells. This form most frequently arises in pigmented moles of the skin or within the eye. It is exceedingly malignant, grows very rapidly, and gives extensive metastasis, particularly in the liver, the secondary growths frequently containing more pigment than the primary tumor.

CHAPTER III.

THE DESTRUCTION OF MALIGNANT GROWTHS BY THE LOCAL CATAPHORIC DIFFUSION OF METALLIC IONS.

Whatever truth may be uncovered by the further study of malignant disease, there can be only corroboration and explanation of at least one or two facts already in our possession,

the correctness of which has been amply proven. Of these the most important relates to the purely local character of the primary growth at its first appearance, and the possibility of its eradication in this stage by the use of effective means. We may be as yet only on the threshold of the discovery why the cells of a cancerous tumor possess the power of migrating into and eroding surrounding tissues—the central fact of malignancy—but we do know that the potential energy of a cancer resides within or between these cells, and that this potential energy may be destroyed by the complete removal or destruction of all abnormal activity in the affected region.

It may be unequivocally stated, therefore, that, in spite of our ignorance of the true nature of the cancer cell, *an incipient cancerous growth in an accessible situation, which has not given rise to metastasis, may be totally destroyed by appropriate means, thus curing the patient.* Cancer is, therefore, curable, under the conditions mentioned, and the full realization of this fact is of the utmost importance to sufferers. Of equal importance is the knowledge that *internal metastases occur very early in many forms of cancer, and that when this has been permitted to happen through delay there is at present no known means of cure.*

Referring, therefore, wholly to growths still local, or with but slight and yet accessible regional dissemination, the question of greatest importance relates to the best method of destruction or removal, for at present no other means of cure exists. It is to this class of so-called operable cases that this work is intended mainly to refer, though many of the cases recorded in these pages show the difficulty of selecting them while yet in this stage, and illustrate the value of the method as at least a palliative in the inoperable class.

The recent history of radiotherapy indicates that the hopes entertained at first for x-radiation as an effective method in operable growths have resulted in disappointment, except for epitheliomas of the skin. The feeling is apparently general that the rays should be preceded, at least, by more positive operative methods when possible. A fuller recognition of the dangers of metastasis occurring during the prolonged treatment by this method should accentuate this reluctance to trust to it alone in the classes most liable to this sequel. Until massive cataphoric sterilization was proposed for certain cases

we were, therefore, thrown back on the knife, thermocautery, and caustics as the surgical remedies promising operative cure.

Removal of all affected cells and intercellular substances by the knife, thermocautery, and caustics has unquestionably been accomplished in some instances, particularly since the adoption of the modern extensive knife operations in which all surrounding tissues are removed at the same time with the growth, and there can be no question but that a larger number of successful results would follow an earlier resort to the latter form of operation than the usual dread of the knife permits. But the continuing disfavor of the knife in the treatment of cancer is doubtless in part due to unwise attempts to employ it where complete removal is impossible, or where the act of removing the growth has resulted in such handling of the tumor, still laden with living cancer cells, as to result in an operative reimplantation of the cells in the cut edges of the wound. It is at least certain that what progress has been made of late in the knife treatment of cancer is along lines that make this reimplantation unlikely. Unless the growth has been removed to its remotest prolongations, together with all infected glands, *without wounding the growth itself or permitting the tumor juices to come into contact with the cut edges of the healthy tissue*, the results will be no better than those attained in the past—results that were indicated in the statement of the late D. Hayes Agnew that he had removed a cart-load of cancerous tumors in his time, but that all the patients from whom they had been removed had ultimately died of the disease.

How difficult this complete removal without reimplantation is of accomplishment in some cases only the practical surgeon knows. In many situations, particularly within cavities, it is essentially impossible; and much attention has, therefore, been given to the thermocautery, either alone or following an attempt at removal with the knife. Used alone, the thermocautery or caustic pastes cannot be relied upon to secure sufficient penetration; when used after the attempted extirpation with the knife or curette it is extremely likely that the cancer cells have already been aspirated into the cut veins or lymphatics to set up regional or general metastases.

With the sole exception of the wide-sweeping knife operation, the surgical methods mentioned are, therefore, ineffective or prone to cause operative reinfection, and thus not only fail

of their object, but lead directly to an intensification of the disease.

That wide-sweeping knife operations are at times themselves ineffective can only be due to the fatal delay that permits metastases to be implanted before operation in cases that should have been operated upon many weeks, months, and even years before consent was given. Against this form of mental delinquency on the part of sufferers no operative remedy is of avail.

(To be continued.)





HERBERT F. PITCHER, M. D.,
President of the American Electro-Therapeutic Association.

Editorial.

THE SEVENTEENTH ANNUAL MEETING OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

THE meeting held at Boston on the 17th, 18th and 19th of September was one which will be remembered as one of the most successful and scientific sessions in the history of the American Electro-Therapeutic Association. The papers presented were of unusual interest and the discussions participated in by men generally familiar with the work, were instructive. From the general unanimity of sentiment, and the expressions of scientific recognition of pregnant truths, it is certain that the members of this Association are pursuing their work in a highly scientific manner. The social features of the meeting were also greatly appreciated by the visiting members.

The tour in the automobile during which historical points of interest were pointed out in the cities of Boston and Cambridge and the evening entertainments and buffet lunch were sources of much pleasure and entertainment. The exhibit under the management of the Committee on Exhibits was a feature of the occasion and a source of much profit to the members and exhibitors. The attendance at this session was above the average and great interest was manifested by all. The consideration of change of name of the Association came up for final action and brought forth a very warm discussion after which many who had been ambitious for the change to a more comprehensive name since the work of the Association has covered what seemed to be the broader field of physical therapeutics, were convinced of their error. It was suggested that under the existing scientific idea of the electron theory, that electricity as an energetic force together with the recognition of its ionic substance and a growing conception of its universality, were abundant reasons for retaining the historic name. Likewise electricity as a source of energy is associated with all types and rates of vibration, possessing or furnishing the characteristic qualities, essentially physical. It was therefore finally resolved that the name of the Association should remain the same as it has been during the past seventeen years of its existence, during which time it has been instrumental more than any other organization in the world in founding and establishing the present advanced state of our science.

STANDARDIZATION OF PHYSICAL METHODS IN THERAPEUTICS.

At the recent meeting of the American Electro-Therapeutic Association the first step was taken looking to the adoption of a systematic plan of investigation and research which will unify professional opinion and establish definite laws or methods for the employment of physical measures in therapeutics to meet all indications.

It was provided that committees of the Association be appointed by the President whose special duty it shall be to investigate and report the physical actions, physiological effects, and therapeutic indications for the employment of physical measures by the respective committees on the subjects delegated to them, and that the chairmen of the committees shall themselves constitute a committee on research with the president *ex officio* as chairman, who shall meet at least twice during the intervals between meetings, and prepare a report which shall be presented at the annual meeting.

Under this plan it will also be incumbent upon the chairmen of the committees, and of members of the respective committees who have made some individual research, to present papers bearing upon the respective field and work of their committee.

By this means the American Electro-Therapeutic Association will be extending to the medical profession the most interesting, practical, and instructive programme that could be presented, which when repeated year after year, by a definite and systematic effort will increase its scope of usefulness, enriching the field as it could never be accomplished by an unorganized effort. It is hoped that by such a plan of procedure, it will be possible within a few years to make these facts familiar to the whole profession. If successful, the Association will become the greatest benefactor of humanity.

In connection with the full accomplishment of this plan, no need is so greatly felt as an endowment that would give the investigators the facilities for making research and investigation of many subjects which cannot be otherwise so well and completely effected.

If some benevolently disposed individual of wealth could be brought to appreciate the value of this work, and place in the

proper hands the means for carrying out these investigations, that person would become one of the greatest benefactors of the human race. Laboratories have been established for institutions looking to bacteriological research and for improving the condition of the aged, which are to be commended; but the person who would emulate these endeavors by the establishing of an institution having laboratory and clinical facilities for making research into the physical and physiological effects and therapeutic indications for the employment of electricity, light, heat, mechanical vibration, exercise, diet, etc., would confer a benefaction upon humanity which would redound to his glory and afford a means of education to the medical profession in the direction to which the professional minds are turning. For since the inroads made by the leading minds of the profession, pointing to the impotency of the therapeutics of the past and the present day, intelligent men and women on all sides are in quest of means which shall replace the waning therapeutics of drugs.

* * *

INTERNATIONAL CONGRESS OF PHYSIOTHERAPY.

The meeting of the II. International Congrès de Physiothérapie assembles at Rome October 13-16, 1907. Dr. Fred H. Morse, of Boston, and Dr. Wm. D. McFee, of Haverhill, Mass., will represent the American Electro-Therapeutic Association as delegates to this Congress, and also as representatives of the United States Government.

A goodly number of Americans have contributed valuable papers and the world of physiotherapy are looking forward to the reports of the Congress.

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EDITORIAL NOTES.

At the recent meeting of the American Electro-Therapeutic Association the following officers were elected:

Herbert F. Pitcher, President; Dr. Edward C. Titus, 1st Vice President; Dr. J. D. Gibson, 2nd Vice President; Dr. Richard J. Nunn, Treasurer; Dr. Albert C. Geyser, Secretary; and Drs. Morris W. Brinkmann and Chas. R. Dickson, members of the Executive Council.

The first meeting of the electrical section of the British Medical Association, held at Exeter, was eminently successful. The papers were exceptionally good. This meeting marks a new epoch in electro and physical therapeutics in Great Britain, for hereafter will be published in the Transactions of the Association papers which will serve to educate the uninformed

members of the medical professional in the direction in which they must ultimately follow.

The President of the American Electro-Therapeutic Association announces the following committees for the ensuing year:

On Induction Coils and Alternators:

Morris W. Brickmann, M. D., 54 West 90th St., N. Y. C.,
Chairman.

Alfonso D. Rockwell, M. D., Mihran H. Kassabian, M. D.

Committee on Meters:

Walter H. White, M. D., 220 Marlboro St., Boston, Mass.,
Chairman.

Geo. Z. Goodell, M. D., Isaiah Anthoine, M. D.

Committee on Cataphoresis:

Charles R. Dickson, M. D., 192 Bloor St., Toronto, Can-
ada, Chairman.

Marcus F. Wheatland, M. D., Marcellus Reeves, M. D.

Committee on Classification and Nomenclature:

Wm. Johnson Jenks, 32 Broadway, New York City,
Chairman.

Elihu Thomson, Samuel Sheldon, Ph. D., Charles Lorenzo
Clark, Wm. James Morton, M. D., Morris W. Brink-
mann, M. D.

Committee on Static Electricity:

Wm. Benham Snow, M. D., 349 West 57th St., New
York, Chairman.

Francis H. Humphris, M. D., Wm. D. McFee, M. D.,
Leigh F. Sturgis, M. D., Thos. H. Cannon, M. D.

Committee on the Constant Current:

Margaret A. Cleaves, M. D., 616 Madison Ave., N. Y. C.,
Chairman.

Fred H. Morse, M. D., Francis B. Bishop, M. D., W. W.
Eaton, M. D., Roger S. York, M. D.

On Electro-Chemical Surgery:

Geo. Betton Massey, M. D., Professional Bldg., Phila.,
Pa., Chairman.

Amédée Granger, M. D., Wm. D. McFee, M. D., Marcus
F. Wheatland, M. D., Geo. E. Allen, M. D.

On Phototherapy:

Edward C. Titus, M. D., 127 West 11th St., N. Y. C.,
Chairman.

Thomas D. Crothers, M. D., Henry Finkelpearl, M. D.,
F. G. Barrett, M. D., Thomas W. Brockbank, M. D.

On Radiotherapy:

Jefferson D. Gibson, M. D., Commonwealth Bldg., Den-
ver, Colo., Chairman.

E. T. Nealy, M. D., Sinclair Tousey, M. D., Lilly O. Bur-
bank, M. D., Wm. Benham Snow, M. D.

On Radiography:

Milton K. Kassabian, M. D., Professional Bldg., Phila., Pa., Chairman.

Albert C. Geyser, M. D., Geo. N. Stover, M. D., Geo. C. Johnston, M. D., Herman C. Frauenthal, M. D.

Committee on High Frequency:

Frederick de Kraft, M. D., 148 West 76th St., New York City, Chairman.

Frank B. Granger, M. D., Walter H. White, M. D., Frederick F. Strong, M. D., Frank H. Sweet, E. E.

Mechanical Vibration-Therapy:

Fred H. Morse, M. D., 6 Beacon St., Boston, Mass., Chairman.

Geo. E. Allen, M. D., W. T. Patch, M. D., Richard J. Thompson, M. D., Cecil N. Money.

Committee on Thermotherapy:

Francis H. Monroe, M. D., 530 Orange St., Newark, N. J., Chairman.

Clarence E. Skinner, M. D., Geo. Z. Goodell, M. D.

On Dietetics:

Sigismund Cohn, M. D., 116 East 79th St., New York City, Chairman.

Otto Jeuttner, M. D., Pitts Edwin Howes, M. D., Byron S. Price, M. D.

On Hydrotherapy:

Curren Pope, M. D., Louisville, Ky., Chairman.

Exercise Therapy:

Henry W. Frauenthal, M. D., 783 Lexington Ave., New York City, Chairman.

Watson W. Savage, M. D., Howard Humphris, M. D.

Reactions:

Morris W. Brinkmann, M. D., 54 West 90th St., N. Y. C., Chairman.

Albert G. Geyser, M. D., Alfonso D. Rockwell, M. D.

The following were added to the membership of the American Electro-Therapeutic Association at the last meeting:

George E. Pfahler, M. D., Philadelphia; William R. Musson, M. D., Antrim, N. H.; Sam. St. John Wright, A. B., M. D., Akron, Ohio; Russell Bingham, M. D., Fitchburg, Mass.; Robert A. Black, M. D., Virginia Hot Springs, Va.; Walter F. Martin, M. D., Battle Creek, Mich.; Cecil N. Money (associate), Boston, Mass.; George E. Haller, M. D., Philadelphia; John D. Proctor, M. D., Keene, N. H.; Marcelus Reeves, M. D., So. Boston, Mass.; John Duff, M. D., Charlestown, Mass.; Stephen F. Birdsall, M. D., Glens Falls, N. Y.; Ira J. Prouty, M. D., Keene, N. H. Elected at the Council Meeting, September 20, 1907, J. Willard Travell, M. D., New York, and Chas. F. Spangler, M. D., Kane, Pa.

Progress in Physical Therapeutics.

GYNECOLOGY AND ELECTRO-CHEMICAL SURGERY.

EDITED BY G. BETTON MASSEY, M. D.

Zinc-Mercury Cataphoresis in the Cure of Piles and Caruncle.

By Eugene Carmichael, M. D., Sac City, Ia., in Albright's Office Practitioner, September, 1907.

"In presenting this article I am not claiming originality of method, for to Dr. Massey is the medical world indebted for the discovery and elucidation of this, one of the most, if not the most, potent of electrical modalities.

"I simply desire to show that proper equipment of knowledge, apparatus, and courage may be so combined as to relieve the suffering of thousands who would continue to suffer rather than submit to the use of the knife or a chloroform operation.

"In the treatment of hemorrhoids by the zinc-mercury method I have found that the old meaty tumors are the best suited to this treatment. These we find sometimes as internal piles that protrude and remain out after stool, regardless of having been replaced by the patient. Ofttimes they become eroded and bleed freely; they are very sore and sensitive to touch, and are a source of constant distress which ultimately drives the patient to the office in a state of mental, nervous, and physical wreckage. Another class of cases to which this treatment may be adapted are marginal piles, those olive-shaped tumors that extend from the skin margin up to within the grasp of the external sphincter. You will observe that both varieties mentioned are of easy access, being in plain sight and not requiring the use of a speculum.

"Now, if I have made it plain that it is the more solid visible growth to which this method is specially adaptable, I shall proceed to give you the details of my technic.

"First I saturate a pledget of cotton of sufficient size to cover the protruding pile with a 10 per cent. cocaine solution. A tin or platinum electrode, also covered with cotton wet in the cocaine solution, is placed and held against the cotton covered tumor. This electrode is connected with the positive pole of the continuous current, the negative being connected to a pad wet in hot 1 per cent. soda solution, and placed on the patient's thigh. Now the current is gradually turned on and increased

to about 10 milliamperes, and left ten or fifteen minutes while the zinc points are being prepared.

"Take ordinary sheet zinc, and with a pair of scissors cut pointed strips one-quarter inch or less wide and one and a half to two inches long. Dip these into a ten per cent. solution of sulphuric acid and immediately into mercury, with which they will at once become perfectly amalgamated. I usually measure with my eye the thickness of the growth I wish to pierce, and amalgamate only sufficient of the point to penetrate it nicely, as the amalgam soon becomes very brittle and is more easily broken if the whole strip is amalgamated. Before inserting the points I inject a solution of 5 per cent. cocaine and adrenalin, equal parts, with my hypodermic syringe. This further anesthetizes the tumor and lessens hemorrhage, which, however, is never much—in fact, in some cases only a few drops. The next step is to insert one, two or three points, held in a needle holder, according to the size of the tumor; usually two is sufficient. If the point does not easily penetrate the tissues I often make a puncture with a small bistoury and then insert the point and immediately turn on the current. With the points connected with the positive and the negative pad as before, I increase the current to twenty-five milliamperes within five or ten minutes, according to the degree of anesthesia produced and the tolerance of the patient, and leave it at that for twenty minutes, or until the tissues around the points appeared blanched, or rather translucent and devitalized. This peculiar appearance is more easily recognized after experience than described. When a sufficient degree of devitalization has taken place the current is slowly turned off, the points removed, a rectal suppository containing cocaine, morphine, and atropine (Wyeth's No. 47) is inserted, an ointment strong with orthoform applied, and the patient gets up and walks home, having been instructed to keep the parts well anointed and use an enema, when the bowels feel like they want to move. One large tumor or two small ones may be destroyed at each treatment.

"The only case I have had in which any disagreeable symptoms have arisen after this treatment was in an out-of-town patient, a weakly woman, aged sixty-eight. It was the second treatment, ten days from the first, which was painless throughout. Four or five days after this second treatment she developed those after-stool pains of irritable ulcer, which continued two or three days, but which promptly subsided upon using the morphine suppository. Further, this same patient had a very irritable urethral caruncle, which I treated the next day in the office, after giving the first treatment for the piles. One treatment with two points, using twenty milliamperes for twenty minutes, cured the condition.

I use this method almost exclusively in skin cancers, and have not one failure to my credit so far, with the single exception of a cancer of the lip. In this case I found the patient could not endure a strong enough current long enough to thoroughly devitalize the principal tumor and sufficiently impregnate the surrounding tissues with the oxychloride of zinc and mercury to destroy the few remaining cancer cells. The consequence was recurrence and resort to a cure with a cancer paste. Cancer of the lip should only be undertaken under general anesthesia.

I have purposely omitted all theoretical discussion of this method, as that may be had more profitably from Dr. Massey's book.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

"Roentgen Treatment of Chronic Bronchitis."

Following up the announcement, by Schilling, in the December Journal of 1906 of his favorable experience with systematic Roentgen-ray treatment of chronic bronchitis and bronchial Asthma, Immelman reports a series of ten patients treated by the Roentgen-ray with a markedly fine result. The asthmatic attacks were aborted and relief was almost immediate. He exposed the front, back, and sides of the thorax in turn, a total exposure of ten minutes. Asthma, due to cardiac or nervous factors, is not amenable to this treatment, which seems to have its specific action on the bronchitic element.

"A Case of Rhinoscleroma Treated by the X-ray." By Milton J. Ballin, M. D. N. Y. M. J., March 16, 1907.

Hebra first drew attention to the fact that rhinoscleroma was a distinct disease characterized by the formation of hard nodules in the mucous membrane of the nose and throat, which eventually break down into ulceration and finally form into bands of connective tissue. Mikulicz has been able to make definite distinction between this disease and granulation, sarcoma and tertiary syphilis, and lupus hypertrophicus or carcinoma and adenoma. This disease has always run its slow insidious course, often lasting months and years. Until cicatrization or the process finds new foci for invasion, it remains localized to the mucous membranes of the nose and throat and never undergoes metastasis to other regions of the body. The

prognosis has been heretofore as incurable, and the latest textbooks agree that medication of all kinds, both internally and externally, have proven failures. The writer reports this case mainly to demonstrate the surprising and beneficial influence of the x-ray treatment upon growths of this nature. It has been only within the last year that the x-ray has been applied to this disease with such gratifying results that we may now say we have at our command an agent by which we can stay the processes of the disease, if not bring about a cure, which was formerly looked upon as hopeless. In this case the x-ray was the only thing used. The author gives several photographs and a brief history of the case. Patient, female, fifty-three years old, Russian birth. No other members of the family had ever had the disease. The patient was sixteen years old before she began to complain of a sore throat and a catarrhal condition of the naso-pharynx. This grew worse until it finally resulted in an ulceration of the pillars of the tonsils and the posterior walls of the pharynx. These were finally healed and left large cicatrices. The uvula disappeared later, after which the posterior nares and the nose itself became involved. A great many operations, as well as much medicine, proved useless. The woman was in perfect health except for the condition of the nose and pharynx. The larynx was absolutely free and not involved in the process. The pharynx was one mass of firm cicatrices, the uvula was entirely gone and presented the appearance of a partial cleft palate. The posterior nares and nose were filled with these bands of tissue. The nose was double its normal size. The nasal passages were entirely occluded so that respiration through the nose was entirely suspended. The nose seemed to be one large mass from which the outlines of the nostrils were entirely obliterated. It looked like one globular mass. The skin was red and tense and the lower part was covered with large ulcerations, which gave forth a watery secretion. The entire nose was tender to the touch. The treatments by the x-ray at first were given at a distance of three to four inches and the rays were allowed to play upon the parts three or four minutes, and she was treated three or four times a week. The patient suffered no inconvenience of any kind from this treatment. In this case the exposures were given with the high-frequency current for a short time instead of a long exposure with low frequency. The results in the cases have been remarkable, even more than was expected. At the fifth treatment the nose was reduced to its normal size, the redness disappeared, the tissues became softer and more pliable, and the outlines of the nostrils returned. The tumefied mass, which protruded at the nostrils, retracted entirely, the ulcerations dried up and the interior part of the tip of the nose, which reached down as far as the lip, resumed its normal position and shape. He thinks the entire condition

will be eradicated. He calls attention to the case of Dr. Poltizer, showing a large tumefaction of the nose and occlusion of its passages, which was greatly benefited by the x-ray.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Catching Cold.

In a recent editorial on this subject in the Medical Record, the following interesting observations were made: "The rationale of the causation of the ordinary 'cold' is pretty well understood at the present day, and it is generally conceded that when circulatory disturbances or vital depression are produced as the result of localized or general chilling of the body surface, newly entered or already present pathogenic bacteria are enabled to attack the body with very good chances of success. At such times it is said that the powers of resistance are below par, and consequently the bacteria gain an easy victory. This point was illustrated in telling fashion by Durck, who found that rabbits infected with pneumococci developed pneumonia if they were subjected to severe cold, whereas unchilled control animals survived. The mechanism of this weakening of the vital forces has not been satisfactorily explained, however, and considerable interest, therefore, attaches to experimental work on the subject recently done by Franz Nagelschmidt. This observer contributes to the recent Senator Festschrift a description of his studies on the hemolytic and bactericidal power of the blood after the animal has been exposed to cold. Rabbits and goats were used, and the activity of the antibodies of the serum was tested before and after immersion of the whole animal or portions of its body in ice water for varying lengths of time.

"The results obtained showed some curious inconsistencies that still demand explanation, but in general it may be said that by chilling the surface it is possible to reduce the number of antibodies in the blood to a very marked degree. This means that the body is deprived of a goodly proportion of its defensive weapons, and, therefore, under such conditions it easily falls a prey to infections of all sorts.

"The effect of cold in bringing on attacks of paroxysmal hemoglobinuria is well known, and it may be that this obscure condition will be illuminated by further developments along the same line of investigation. A point of practical importance is the fact that it was found that repeated exposure to slight degrees of cold brought about an increase of antibodies, and

this observation, therefore, affords a theoretical justification of the practically approved methods of 'hardening' the body by hydrotherapeutic and other methods of training. Such procedures should not only serve to protect against colds and allied conditions, but also should render the body better able to cope with bacteria and other noxa of all kinds."—(Modern Medicine, June, 1905.)

The Effects of Baths on Metabolism and Blood Pressure.

Bain and Franklin, in the London Lancet of April 29, 1905, state that electric immersion baths are used largely to induce restoration of contractile power in cases of muscular weakness or atrophy resulting from nerve lesions or essential muscular dystrophy, and in cases of neurasthenia and the latent form of hysteria. They are also useful as a general tonic measure in cases presenting no definite disease, but suffering from slackness and want of tone. The results obtained on metabolism are not sufficiently striking to justify the frequent employment of these baths in cases of chronic gout unless the slight increase in elimination of urea and uric acid which followed the constant current may be considered an indication in this direction.

The striking results obtained on the hemoglobin value of the blood with the light and ozone bath point to its use in cases requiring sweating baths, in which anemia is present, and further tend to show that the daily breathing, for a stated time, of air highly charged with ozone may be a useful auxiliary measure in the treatment of intractable cases of chlorosis and secondary anemia.

Peat baths are largely used in cases of chronic pelvic disorder of an inflammatory nature. Their action, which resembles that of a widespread poultice, materially aids in the absorption of effused products. They are also used for cases of chronic intractable rheumatism and gout and in local manifestations of these disorders, such as lumbago or sciatica. The results obtained are not conclusive enough to indicate strongly in which direction they are likely to be of service.

Thermal sulphur baths are largely used at Harrogate in the treatment of gout, rheumatism, and functional derangements of the liver, and also for their local action on the skin in cases of skin diseases. In the former, as well as in the latter, experience shows that they are of undoubted value, though their mode of action is by no means clear. Apart from their marked effect on blood pressure, which has been previously shown, this investigation proved nothing conclusive as to their influence on metabolism.

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

On Opsonins and Treatment by Bacterial Vaccines.

Bunch (Lancet, Jan. 19, 1907) contributes an article of some length upon this subject in which he calls attention to the fact that destruction of typhoid and cholera bacilli can be brought about by lysins which are present in the corresponding immune sera after artificial inoculation, and that lysins have been assumed to exist in other diseases also. In diphtheria and tetanus antitoxins are employed clinically, which neutralize the respective toxins. Metchnikoff holds that the destruction of bacteria is carried on by the phagocytes alone, and ascribes the whole protective influence to them. It has, however, been shown that these, washed absolutely free from serum and the substances contained in it, have of themselves no phagocytic action on bacteria.

Buchner was able, by chemical stimulation, to cause the secretion into the pleural cavity of rabbits and dogs of leucocyte-containing exudations which possessed bactericidal powers stronger even than those of the blood or serum of the same animals. Under such conditions phagocytosis proceeded very actively. It is, therefore, difficult to decide as to whether their bactericidal action depended upon phagocytosis or upon alexins or antibodies contained in the exudate. By freezing the fluid and killing the leucocytes it was observed that the bactericidal power was in no degree lessened. Hence it was evident that the bacteria-destroying qualities of the fluid were dependent upon antibodies. Numerous observers have shown in the blood the presence of opsonins, substances which become attached to the bacteria in such a way as to render them capable of absorption and destruction by the phagocytes.

Wright and Douglas assert that opsonins are destroyed by heat and therefore differ essentially from the immune body. In a considerable number of infections specific opsonins have been demonstrated. An increase in the opsonic condition of the blood may be brought about by the injection into the organism of vaccines. Of these the best known is the "old" tuberculin of Koch. The preparation is a clear, brownish fluid, somewhat viscid from the presence of glycerin. It is diluted before using to the required dose. Injected into tuberculous individuals in amounts of one cubic millimetre, it produces a rise in temperature.

This tuberculin, though sterilized, is much less used for therapeutic treatment than tuberculin Koch T. R., which is prepared from the virulent culture of tubercle by drying, grinding up the bacilli, and by washing and removing the ex-

tracellular toxins, which chiefly constitute the "old" tuberculin. The residue is made into an emulsion with distilled water after trituration, centrifugalized, and the supernatant fluid pipetted off. Twenty per cent. of glycerin is added to preserve it, and it is standardized so that 1 cubic centimeter contains 10 milligrammes of solid substance. Dilutions can then be made to any desired dose, and these are heated for an hour at 60° C. in capsules so as to kill any possibly contained living bacilli. The dose to begin with is 1-1000 milligramme, usually less. It is injected subcutaneously in a cleanly manner. These injections will cause neither constitutional nor local reaction. The subsequent dosage both in regard to amount given and intervals between doses is regulated by the opsonic index to tubercle.

The elaboration of protective substances in the organism can be induced by chemical substances or vaccines prepared from bacteria other than the tubercle bacillus. The author states that he has injected vaccines of pneumococci, streptococci, and the various forms of staphylococci during the last eighteen months. These vaccines are emulsions of that species of organism which has produced the disease in the patient, and inasmuch as different strains of the same organism differ greatly the vaccine should, when possible, be prepared from a pure culture of that particular organism grown directly from the lesion to which it has given rise in the patient. This is sometimes a difficult matter. Thus in pneumonia a mouse must be inoculated with the patient's sputum, or in empyema with the pus, and a pure culture of the pneumococcus obtained from the mouse's heart blood, and a vaccine made from the emulsion. The emulsion prepared from such a culture must be centrifugalized and standardized so that a certain volume contains the dead bodies of a certain known number of bacteria, plus their products of metabolism. The initial dose must always be small, since patients react very differently, and care must be taken not to induce too marked or too prolonged a negative phase. Inoculation with the vaccine is followed by a period of intoxication characterized by decline in the antibacterial power of the blood, called the negative phase. This is followed by a positive phase, in which the antibacterial power of the blood is greatly increased. For tubercle inoculations this positive phase may be maintained for as long as a month; very often it drops at about the end of ten days. If too large a dose be given the positive phase may not make its appearance at all. The important point in dosage is the use of the minimal dose which will produce a satisfactory response, nor must this be increased until it ceases to produce its effect; nor should it be repeated until its effect is passing off. Since the increase of the opsonic index in the case of local tuberculosis is without

avail unless the blood be brought directly in contact with the bacteria, Bier's congestion is a powerful adjuvant to the tuberculin treatment in peripheral lesions.

Bunch further notes that a diminution of the viscosity and coagulability of the blood can be greatly accelerated by the internal administration of decalcifying agents, such as citric acid. Often operative measures are powerful adjuvants.

Bunch states that when the opsonic index to tubercle is above 3.0 a positive diagnosis of tuberculosis may be made. An index to tubercle below 0.8 is undoubtedly abnormal and indicates either a strong disposition to infection, such as to be expected in a member of a family several of whom have already shown signs of pulmonary tuberculosis, or that infection has already taken place.

An index appreciably above normal means, as a rule, that infection has already taken place, especially if repeated estimations show considerable fluctuations of the opsonic index.—*Therapeutic Gazette*.

Chronic Urticaria and Hypothyroidism.

Leopold-Levi and De Rothchild (*Comp. Rend. Soc. de Biol.*, lxi, 35, 1906) thinks that urticaria is not an uncommon expression of hypothyroidism, and represents the cutaneous localization of an acute intoxication. They give an illustrative case of a woman who suffered from successive daily outbreaks of wheals and erythema. She also complained of irregular menstruation, increasing obesity, fatigue and sleepiness. The thyroid was increased in size on the right. Two cachets of thyroid extract were given daily with immediate improvement. The patient stopped treatment after nine days, when all the symptoms returned. She then resumed the thyroid, and has taken it irregularly ever since, with the result that there has been no return of the eruption except for a few scattered lesions especially at the time of the menstrual period.—*Jour. of Cutan. Diseases*, March, 1907.

The Value of Tuberculin T. R. as a Diagnostic and Therapeutic Agent in Recognition and Treatment of Tuberculosis of the Eye.

Charles Stedman Bull considers T. R. of value in the diagnosis of tuberculous affections of the eye, and believes that it is of some value as a therapeutic agent, especially in cases of tuberculosis involving the lids, conjunctiva, cornea and iris. Cases are cited.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

Opsonic Treatment of Certain Diseases of the Skin. By Geo. Pernet and J. L. Bunch, British Jour. Dermatology.

The authors report excellent results from the employment of opsonic treatment in three cases of lupus vulgaris, one of localized bullous eruption, and one of severe ecthyma. They also treated a case of acne vulgaris, but with practically little or no success.

The plan of treatment was to determine the nature of infection and then the antistaphylococcal or antistreptococcal injections were given as indicated. The patient's opsonic index was taken, and then the injections were given until it was normal, when the injections were discontinued. The first case of lupus vulgaris was one of extensive involvement on different areas of the body. It had lasted ten years. Injections of tuberculin were given at various intervals, the indications being determined by the index, and the improvement was marked. The chart of the case showed that the patient's opsonic index remained low as long as relatively large doses of tuberculin were administered, and only reached normal when doses of only 1-1200 mgm. were given. In the second case the improvement under the tuberculin injections was slow until the patient's index to staphylococci being found to be subnormal, she was given an injection of prepared staphylococci aurei, after which improvement was rapid.

In the case of severe ecthyma, cultivations from a lesion showed a mixed infection; the opsonic index to staphylococcus aureus was 0.87 and 0.9 to staphylococcus albus. The patient recovered entirely under mixed injections, but showed a tendency to recurrence when they were stopped. There was a possibility of syphilitic infection in the case, but no anti-syphilitic remedies were given.

X-ray Treatment of Ringworm. By Dr. J. M. H. Macleod. British Medical Journal.

Dr. Macleod states that the x-ray treatment of ringworm of the scalp is now recognized as the most rapidly effective mode of treating the disease. The single exposure method of Sabouraud has replaced the uncertain method of repeated exposures and fractional dosage. The operator now expects the defluvium of the hair from the exposed area to take place on about the sixteenth day without any marked inflammatory disturbance.

The American Journal of Dermatology claims "there is no permanent benefit from the Roentgen ray treatment, that Sabouraud's method of which so much was expected is a failure, that while the x-rays are very efficient for depilating they have no destructive effect upon the parasite of ringworm; in consequence of this the hair starts growing again in from six to eight weeks after treatment and the fungi begin to proliferate again."

[We all know the Roentgen ray may not destroy the parasite, but by making the hairs fall out while a parasiticide lotion is being used, a cure of the ringworm naturally results. We know it is fairly easy to cure ringworm of the body, but our great difficulty in treating ringworm of the scalp was due to the inability of getting any drug to penetrate to the deep hair roots. This the Roentgen rays will do, causing the hair to fall out, bringing the parasite with it.

While treating the scalp or other hairy parts of the body, Sabouraud makes daily application of the tincture of iodine (1 in 5) to the healthy parts, till depilation is complete. Resorcin one per cent., in eau de cologne, is a good lotion also.

To be successful in the treatment of any disease we should select the best-known remedy, and then carry out the method to the minutest detail. The Roentgen rays should only be used by medical men who are not only proficient in the use of the rays, but are willing to give the time and attention necessary to the proper treatment of diseased conditions. If the proper technique is fully carried out in the treatment of ringworm of the scalp and beard, the results will prove more satisfactory than by any other method. The above journal speaks of the prevalence of ringworm in Europe, that it has grown to such proportions in European countries that it has been found necessary to build schools for children with ringworm. It has become a matter of material concern, and the clinics and physicians note the growing numbers of those affected with these troubles. All remedies prior to the discovery of the x-rays have failed. Great things were predicted of the latter treatment, but unfortunately—according to the American Journal of Dermatology—the Roentgen ray is far from being the ideal cure for ringworm. We think the A. J. of D. "looks through the glass darkly." in anything relating to the Roentgen rays. H. F. P.]

SOCIETY MEETINGS.

TRANSACTIONS OF THE SEVENTEENTH ANNUAL SESSION OF THE AMERICAN ELECTRO-THERAPEUTICAL ASSOCIATION, HELD SEPTEMBER 17, 18 AND 19, 1907, IN COPLEY HALL, BOSTON, MASS.

FIRST DAY, SEPT. 17TH, 1907.

Morning Session.

Meeting called to order at 10.20 by the President, who stated: "This meeting will be opened by an address of welcome by the Mayor of Boston, whose reputation has reached you all, and the honor which we feel will be conferred upon the Association by the pleasant things he is going to say to us, I know will be greatly appreciated."

Mayor Fitzgerald's Address.

In welcoming the members of the National and the New England Association of Electro-Therapeutics to Boston, I am proud to recall that the standing of the New England Association is maintained on a high plane in the scientific world. New England, here as elsewhere, whether it be in the arts, the sciences, or the professions, still leads. It is therefore not to be wondered at that the centre of the most advanced thought and development along the lines of Electro-Therapeutics should be located here in Boston, where is situated the greatest and best-equipped medical school in the world, and which maintains the most extensive and perfect system of public hospitals.

In this matter of purely philanthropic endeavor, manifested in the maintenance of our great City Hospital, and the numerous smaller institutions of a similar character, the City of Boston sets an example for the entire country. Throughout the years of the Hospital's existence it has ever been the concern of the City Authorities that it should be maintained on the highest possible plane of efficiency. It is to the unselfish devotion and untiring zeal of such men as Dr. Gay, under whose guidance and direction so much was accomplished to make the Boston City Hospital the model of its kind, and to Dr. H. M. Rowe, the present head of the institution, that the citizens of Boston will be forever indebted. In every department are to be found physicians of the highest standing giving generously of their time and devoting the best that is in them freely for the welfare of the sick and afflicted.

The constantly growing importance of electricity as a curative agent is everywhere becoming more apparent, and in view of the widespread growth of the science in all directions during the recent decade this is not to be wondered at. No matter where we turn in this modern world we are confronted by that strange agent electricity. In the morning we go down to business on the electric car, and during the course of the day we travel up and down in immense office buildings by means of electric elevators; make use of electric call bells, the telephone, the telegraph, and dozens of other electrical devices all tending to improve man's condition or contribute to his comfort. We call on our dentist and find him in waiting with his electric drills, furnaces, and other apparatus peculiar to his profession. We may have our food cooked on electric stoves, or we may have our sense of hearing charmed by the beautiful melodies produced on an electric piano. Everywhere we turn this constantly increasing manifestation of electricity is so obvious that we may rightly be said to be living in the Age of Electricity.

Since primitive men discovered the strange effects produced by rubbing a piece of amber, thoughtful minds have endeavored to explain the phenomenon. Despite the study and research of Franklin, Guericke, Hawksbee, Grey, Dufaye, Nollet, Galvani, Volta, Mesmer, Ampere, and Davy, however, we have scarcely increased our knowledge as to causes although greatly multiplying effects. Equally great as the results obtained by this or that student of science along the more widely known paths of enquiry has been the progress of the science as applied to the uses and needs of surgery. As is always the case where the medical profession is concerned, their efforts and discoveries are known to humanity only by their results. That they have succeeded in combating this or that ill or affliction of mankind is all that we hear, and I am sorry to say it is all that we seem to care about. The noble sentiment which prompts the physician to sacrifice every personal interest to the welfare of suffering humanity is rarely considered.

One often hears the comment that, "The doctor is first to be called and last to be paid." So too, in this development of electrical science, as applied to surgery, it was a physician who laid the foundation of the modern science of electricity, but as in the usual case he is last to be paid the honor due him. I confess it was with considerable surprise that I learned that the word electricity was coined by a physician, Dr. William Gilbert of Colchester, England, physician to Queen Elizabeth. Still further surprising is it to find this pioneer in electrical science making no attempt to apply its use to surgery. Yet judged by its wide-spread application to-day it is doubtful to the layman at least, daily hearing of marvellous cures to its credit, if any single discovery of modern times has

so advanced and aided the art of the surgeon as the Roentgen ray. In this discovery, where Crookes and Finsen share the honor equally with Roentgen, the disciple of electro-therapeutics has found an agent of incalculable value. That the next decade will witness a great advance along this line of scientific development is certain. And it is equally certain that the intelligent discussion and interchange of ideas on the subject by the men who form the associations represented here to-day will in the near future result in banishing from the earth ills which now torture the bodies and vex the spirits of mankind. (Applause.)

Dr. York: Mr. Mayor, President of the Association and gentlemen: It becomes my pleasing duty at this time in behalf of the American Electro-Therapeutic Association to thank your honored Mayor for his kind and eloquent words of welcome. Not being a Cicero or orator of note I have taken no time to prepare for the fitting remarks I should make in response to his speech. I will simply say I thank him most heartily for his welcome to this Association, and while we may not assist him in making Boston "bigger and better" we sincerely trust we will make it busier because we need the money. (Applause.)

Dr. Brinkmann: We have also the honor of being welcomed by the President of the New England Medical Society, Dr. Gay, who I am quite sure will show us many ways whereby our work at this meeting can be made very profitable to all.

Mr. President, Fellows of the American Electro-Therapeutic Association, Ladies and Gentlemen,—As President of the Massachusetts Medical Society, and in behalf of the profession of this State, it gives me great pleasure to welcome you to Boston upon this occasion of your seventeenth annual meeting, and to assure you of a cordial greeting by all who are interested in the valuable work upon which you are engaged.

We are living in an age of specialism. It obtains in all the walks of life, and our profession is necessarily in the foremost rank of the movement. The art and science of medicine has long ago passed the point where it was possible for any one mind to grasp all the various departments, much less to apply each one understandingly in the treatment of disease, which is the main object of all our efforts. Almost every part of the human body and nearly every organ in it has its devotees.

Aside from the time-honored division of physician and surgeon, we now have the alienist, the sociologist, the neurologist, the gynecologist, the aurist, the ophthalmologist, the rhinologist, the laryngologist, the dermatologist, the stomatologist, the orthopedist, the urinologist, the venereologist (if I may be pardoned the liberty of coining a name), the specialist in genito-urinary and contagious diseases, and also in hygiene

and public health, and last but by no means least, the specialist in electro-therapeutics, who has to do with one of the most subtle as well as most powerful forces in the whole realm of nature.

Some of us can remember the time when there was no electro-therapeutics in the sense in which we now understand the term. In "ye olden time" the use of electricity was largely in the hands of the ignorant pretender, and consisted mainly in pressing a button, slipping a switch, or turning a crank, and applying the electrodes to everybody who would submit to their application regardless of their ailments, or even in the absence of any ailment.

In the development of any special method of treatment one of the first and most important objects is to ascertain in the clearest manner possible those conditions which can be benefited by the means at hand.

The charlatan knows little and cares less about this matter. Paying patrons is all that interests him, while the honorable, scientific physician seeks to place the specialty upon a sure foundation upon which may be reared all the superstructure that the conditions may justify. Herein lies one of the chief distinctions between a useful specialty, and ignorant or malicious quackery.

In this great field of development of electro-therapeutics this Association is doing a large amount of valuable work and hence it is worthy of the encouragement and support of not only the profession but of the public as well. May your deliberations upon the present occasion prove to be as satisfactory as can be reasonably expected; may your sojourn with us be so pleasant that you will want to come again; may you never forget that our latch-string is always out, and that you will be assured of a hearty welcome here whenever it suits your convenience to come to this city for your annual convention. (Applause.)

Dr. Brinkmann: Dr. Gay has placed us under obligations by his address, which can do nothing but stimulate good work on our part. We will leave it to Dr. Granger to thank Dr. Gay and tell him why this is so.

Dr. Granger replied:

Mr. President: It is always a delight to be present in any gathering where Dr. Gay is a speaker, and it is a twofold pleasure to respond to his kindly words of welcome, not only because of the man himself, but also because of his official capacity as the President of the Massachusetts Medical Society.

Time was and not so very long ago when, in the minds of many, electro-therapeutics was relegated to the quack, the

woman, and the physician who could not make his living by the time-honored methods.

Despite this odium and calumny little bands of kindred spirits, not only in this country but also in England, and on the Continent, were slowly but surely laying deep and broad the foundation of scientific Electro-Therapy, hence when by the marvelous discovery of the x-rays and their wonder-working power, the attention of the medical profession was directed anew to electricity, it was found that already was there formulated a logical technic, based on a sound pathological and physiological basis.

Immediately followed the attention-arresting work of Finsen in the cure of Lupus by the ultra-violet ray; the adaptation of high frequency currents to therapeutic purposes by the experiments of D'Arsonval, Oudin, and Tesla, coupled with the inventive genius of American manufacturers; the use of mechanical vibration; the high candle power incandescent lights whereby pain is relieved quicker than by a hypodermic of morphine; all these quickly found their respective places and thus on the deep and broad foundation so painfully and courageously laid, was speedily raised our fair structure devoted to electro-therapy.

As an earnest of this let me call your attention to the fact that every Continental hospital of even the slightest pretension has a well-equipped and well-patronized department of electro-mechano-hydro-therapy. Recently by invitation of the British Medical Society the British Electro-Therapeutical Association became incorporated with the former as a section of electro-therapeutics. This recognition thus speedily won abroad must of necessity soon be given here, and hence in behalf of the American Electro-Therapeutical Association it gives me great pleasure to thank you, sir, and the Massachusetts Medical Society for your hospitable and friendly words.

Dr. Brinkmann: It has been customary to hold the Executive Session at this portion of the proceedings of the society, but owing to the lateness of the hour, I deemed it wiser without consent of the members to enter into the work of the society and take up the executive business at the end of the session. If this meets with your approval, we will take it up at the end of the meeting.

Scientific Session.

Address of the President.

"A Historical Sketch of Physio-Therapy," by H. H. Roberts, M. D., Lexington, Ky.; "Electricity a Rational Curative Factor," by Wm. S. Watson, M. D., New York; "Light, More Light," by A. W. Herzog, M. D., New York; "Electric Light Baths in Nervous Diseases," by T. D. Crothers, M. D., Hart-

ford, Conn., were the papers to be read and discussed at this session. On motion of Dr. Dickson, duly seconded, it was moved that all papers not read be placed at the bottom of the list. Carried.

Dr. Morse of the Committee on Arrangements stated that members of the Association would visit the Harvard Medical School this afternoon and on Wednesday evening arrangements had been made for a reception and entertainment.

Executive Session.

It was moved and seconded that the reading of the minutes be dispensed with. Carried.

The Secretary presented the report of the Executive Council, and as the substance of same was incorporated in his report, the latter was read.

Secretary's Report.

Mr. President and Gentlemen:

The secretary takes pleasure in presenting the following report:

During the session of 1906-1907 the association carried on its books 262 members, whereby we find at the end of the season the following division:

Members in good standing.....	189
Resigned	5
Dropped for non-payment of dues.....	12
New members during the year	29
Owing one year's dues.....	25
Died during the year.....	2

A total.....262

Leaving at this meeting on our books

Members in good standing.....	189
Owing one year's dues.....	25

Total214

At our last annual meeting the secretary reported:

A balance of.....	\$ 12.70
Received for dues during the year.....	\$945.00

Total cash.....\$957.70

Expended during the year.....\$542.75

Leaving in the secretary's hands.....\$414.95

Balance in treasurer's hands.....\$105.98

A total cash credit for the association.....\$520.93

All of which is respectfully submitted by the secretary.

Dr. Geyser: I was directed by the Executive Council to state that this gavel (showing gavel) has been in the hands of each and every president since the organization of this Association, and it has been customary to place the names of each and every succeeding president upon its handle, but in time this gavel would no longer hold the names, so Dr. Waite has therefore reconstructed it, leaving the names, simply substituting a new handle, and presents it with his compliments to the Electro-Therapeutic Association.

On motion of Dr. Dickson a vote of thanks on behalf of the Association was extended and the Secretary instructed to communicate the same to Dr. Waite.

Dr. Brinkmann: You have heard the reading of the Secretary's report. Before accepting that report I would like to say a word. When the Secretary took his position a great deal of unperformed work existed and we owe to our Secretary more than a vote of thanks to repay him. He has labored and he has labored well and efficiently and in the true spirit, and I believe that the balance that we now have in our treasury is to be attributed to his efforts.

Dr. Bishop, Harrisburg, Pa.: I think this is the best financial exhibit we have ever had. The Secretary should receive proper compensation because it is unfair for us to expect a man to work without proper compensation and proper appreciation, and I will move that the question of salary be arranged by the Executive Committee and presented to the Secretary. This motion was carried.

(To be continued.)

BOOK REVIEWS.

PRACTICAL THERAPEUTICS. A Text-Book of Practical Therapeutics with Especial Reference to the Application of Remedial Measures to Disease and Their Employment upon a Rational Basis. By HOBART AMORY HARE, M. D., B. Sc., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia; Physician to the Jefferson Medical College Hospital; One-time Clinical Professor of Diseases of Children in the University of Pennsylvania; Laureate of the Royal Academy of Medicine in Belgium, of the Medical Society of London; Member of the Committee of Revision of the United States Pharmacopeia of 1905. Twelfth Edition, Enlarged, Thoroughly Revised and Largely Rewritten. Illustrated with 114 engravings and 4 colored plates. Lea Brothers & Co., Philadelphia and New York.

This well-known text-book has rapidly passed through eleven editions which is the best testimony of its appreciation by the medical profession and recognition of the author as a high authority in drug therapeutics. He has stated that he

leaves the field of electricity and other physical agents to others. In this volume the articles on the treatment of the common diseases of the eye have been revised by Dr. G. E. de Schweinitz of the University of Pennsylvania, and the articles on the Diseases of the Puerperal Period by Dr. Barton Cooke Hirst, Professor of Obstetrics in the University of Pennsylvania, and the articles upon Antisepsis, Gonorrhea, and Syphilis by Dr. Edward Martin of the University of Pennsylvania.

The publishers' work in this volume is done with the characteristic excellent style of Lea Brothers & Co., and is a volume deserving a place in the library of the physician and student of medicine.

FIVE HUNDRED SURGICAL SUGGESTIONS. Practical Brevities in Surgical Diagnosis and Treatment. By WALTER M. BRICKNER, B. S., M. D., Chief of Surgical Department, Mount Sinai Hospital Dispensary, New York; Editor-in-Chief, American Journal of Surgery, and ELI MOSCHOWITZ, A. B., M. D., Assistant Physician, Mount Sinai Hospital Dispensary, New York; Associate Editor, American Journal of Surgery. Second Series. Duodecimo; 125 pages. New York: Surgery Publishing Co., 92 William Street, 1907. Price, \$1.00.

The second edition of this little volume has rapidly followed the first and is an excellent reminder for the busy practitioner and student in points of practical interest with numerous suggestions and procedures, some of which come daily under the observation of busy practitioners. The little book is arranged for convenient reference with colored type descriptive of each region, and will be found a convenient and accurate reference book.

ELECTRO-DIAGNOSIS. Scheme for the Differential Testing of Nerves and Muscles for use in diagnosis by J. MONTGOMERY MOSHER, A. M., M. D. Clinical Professor of Insanity, Neurology and Electro-Therapeutics, Albany Medical College; Attending Specialist in Mental Diseases and Physician to the Out-Patient Department for Nervous and Mental Diseases, Albany Hospital. Illustrated. Albany, N. Y.: Brandow Printing Co. Price, \$1.00 net.

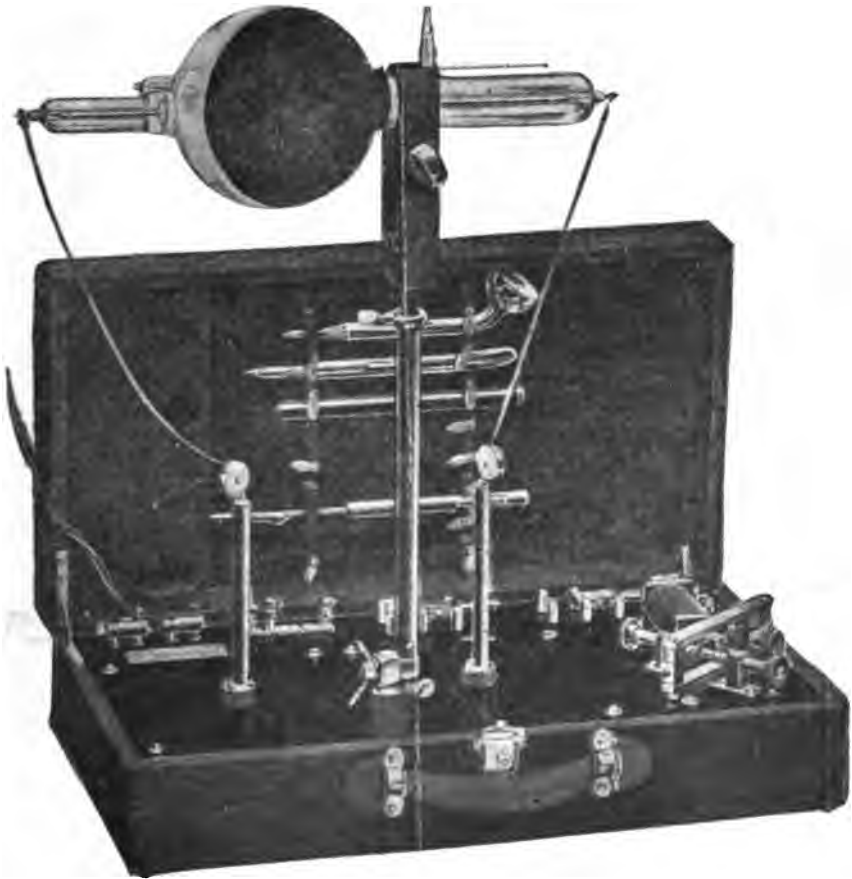
The second edition of this little volume, the first edition of which was so promptly exhausted, will be cordially received. No text-book on the subject of electro-diagnosis in any language has been so well arranged and provided with so practical plates as the work by Dr. Mosher. It is just the book to be in the hands of every worker with electrical currents and physical measures. We commend the volume to all as the most practical text-book on the subject extant.

NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

A PERFECTED PORTABLE X-RAY COIL.

This portable apparatus is unique in many particulars. It operates from either the alternating or direct current circuits,



the only change of mechanism being the moving of a small switch, without changing the type of interrupter. The interrupter, which is a feature of the apparatus, is made after a

new design and is entirely mechanical. The adjustment is simple. When on the direct circuit it may be made either slow or fast by a simple device, while when used on the alternating current, the rate of vibration is synchronized or tuned harmoniously with the cycle or alternation by turning a thumb-screw.

The amount of current, while governed by the inductance rheostat, may be controlled almost entirely by the interrupter; the adjustment of which will allow the passage of a very small amount of current, or it may be gradually raised to a maximum that will flow through the rheostat. The interrupter may be used to any voltage up to 500.

The contact points are made of annealed silver and work with perfect freedom, never sticking or even becoming excessively warm, and with hard usage will last for months. New points may be substituted in a few minutes' time, and at slight cost.

The machine is contained in a strong case of highly-polished quartered-oak, 22 inches in length, 12 inches in height, and 6 inches in width, making a convenient form of portable apparatus. It has removable terminals which when in place stand well up, protecting the connecting cord and is supplied with self-winding connecting lines and plug, the plug in the cable for connecting the machine with any lamp socket.

The apparatus has a special attachment for cautery which gives excellent results. The current may also be used to operate vacuum tubes, several kinds of which come with the apparatus. The control of the machine is always the same whether working the x-ray or high frequency devices. The apparatus sells for \$150, exclusive of tube, and is manufactured by the Synchronous Manufacturing Co., 315 Fifth Ave., New York City.

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THE ELECTRICAL TREATMENT OF PROSTATITIS AND ENLARGEMENT OF THE PROSTATE GLAND.*

BY HERBERT F. PITCHER, M. D., HAVERHILL, MASS.

PRESIDENT AND FELLOWS:—

My reason for presenting this paper, gentlemen, is to place before you a method of treatment of a disease at once so universal and yet so difficult to reach with ordinary remedies. Until within a few years there has been no ray of hope except the knife for the man who slowly but surely travels toward that curse of an old man's existence, "hypertrophy of the prostate gland."

The method of treatment I use obliges me to refresh your memories with a slight description of the anatomy and physiology of the prostate and its relations to adjacent structures. According to Gray's Anatomy the prostate gland is a pale, firm, glandular body, which in shape and size resembles a horse-chestnut. It surrounds the neck of the bladder and commencement of the urethra. It is placed in the pelvic cavity behind and below the symphysis pubis, posterior to the deep perineal fascia, and upon the rectum, through which it may be distinctly felt—especially when enlarged.

It consists of three lobes, two lateral and a middle lobe, so-called. The two lateral lobes are of equal size, separated behind by a deep furrow. The middle or third lobe is a small transverse band—occasionally a rounded and triangular prominence—placed between the two lateral lobes at the under and posterior part of the organ. It lies immediately beneath the neck of the bladder and behind the commencement of the urethra and above the ejaculatory ducts. Its existence is not constant, but is occasionally found at an early period of life as well as in adults and in old age.

* Read at the Seventeenth Annual Meeting of the American Electro-Therapeutic Association at Boston, Mass., September 17, 1907.

In advanced life it often becomes considerably enlarged, and projects into the bladder so as to impede the passage of urine. According to Dr. Messers' researches this obstruction exists in 20 per cent. of all prostates over sixty years of age. Many later authorities claim there is no middle lobe, the structure being entirely a pathological formation. Dr. John B. Deaver says: "That as a teacher of anatomy and as a surgeon he has yet to see a middle lobe either in a living or dead subject. That the supposed middle lobe is only an elongation of the right or left lateral lobe." The gland is tunneled by the urethra and prostatic and ejaculatory ducts. On its floor is a longitudinal, highly sensitive erectile structure, the verumontanum; this is probably the principal seat of sexual sensibility. On either side of this eminence is a longitudinal depression—the "prostatic sinus"—into which the prostatic ducts open; some fifteen or twenty in number. At the anterior extremity of the verumontanum are situated the mouths of the ejaculatory ducts. The orifices of these ducts often become dilated when disease of the prostate or vesicles exists, and are liable to engage the point of a small instrument in an effort to force an entrance into the bladder. This portion of the urethral canal is more liable to infection and disease than any other portion, as it receives the irritative secretions of the prostate and seminal vesicles, when these organs are affected.

The blood supply of the prostate is very rich, the arteries being derived from the external pudic, vesical, and hemorrhoidal.

The veins form a plexus around the sides and base of the gland, connecting with those supplying the rectum and bladder, communicating freely with the hemorrhoidal, spermatic, dorsal vein of the penis, and pampiniform plexus.

This peculiar association of the vascular supply of the rectum, anus, and prostate explains, to a certain degree, their close pathologic relationship. Thus hemorrhoids, constipation, and hepatic obstruction are liable to lead to passive congestion of the prostate, and even predispose to active inflammation. Conversely, inflammatory, and congestive prostatic disturbances may produce rectal tenesmus, hemorrhoids, and proctitis. The veins of the prostatic plexus are prone to become tortuous and varicose in elderly subjects; a condition that is often associated with hemorrhoidal disease. The nerve supply

is from the hypogastric plexus. There is a large supply of filaments from the sympathetic which is also closely associated with that of the rectum and anus, a relationship that forms another strong pathologic link between the two organs. The consideration of the nerve anatomy of these parts enables us to understand the strangury, spasmodic stricture, and retention of urine that often occur as a result of operations about the rectum and anus.

The elaborate sympathetic and sensory nerve supply of the prostate, and the prostatic urethra, is explanatory of the more or less remote reflex disturbances, both mental and physical, that so frequently occur as a result of prostatic disease.

The function of the gland is complex. It possibly assists in expelling the contents of the bladder, but its particular function is sexual. It expels the semen by its rhythmical contraction. It is the nerve center of the orgasm. It secretes a fluid essential as a vitalizing agent to the spermatic germs. It has been called the sexual heart and also the sexual brain, both terms being quite appropriate, as it is a vascular center and a nerve center, and the large supply of sympathetic nerve filaments associated so intimately with the other important organs and tissues in the neighborhood serve to make the prostatic gland subject to neurotic and inflammatory disturbances, causing many reflex symptoms which affect the whole economy, not only producing physical disability but affecting the central nervous system to such an extent as to make the patient hopelessly insane.

It is this reflex action upon the nerve centers which make chronic prostatitis such a potent factor in the etiology of neurasthenia. There is very little difficulty in diagnosing the well-marked case of sexual neurasthenia, but it is the obscure nervous disease, the case with the torpid liver, and constipated bowels, atonic dyspepsia, functional heart disease, neuralgia, headache and backache, insomnia, low spirits, and many times melancholia. These patients may not complain directly of any genito-urinary trouble, but the frequency of chronic prostatitis is much greater than is generally supposed, and if you will take the trouble to examine per rectum you will usually find the hemorrhoidal vessels tortuous, the prostate sensitive and congested to some degree. There will also be distention and tenderness of the seminal vesicles. Careful inquiry will usually

elicit symptoms of irritation of the neck of the bladder, prostatorrhea, and disturbance of the sexual function. In the more pronounced cases of chronic prostatitis all of the symptoms are intensified and many cases are diagnosed as subacute or chronic cystitis, on account of the frequent desire to urinate, and the pain and irritation in so doing. There are usually backache and pains running down the groin and thighs, urethra and spermatic cord. There are dull pains and tenderness in the perineum, making sitting or riding uncomfortable.

These symptoms, together with the disturbed sexual function, make the patient depressed and anxious to an extreme degree. The prostatorrhea is a source of great anxiety, as he imagines it a loss of vital fluid. Many times after urination or defecation the amount of fluid which escapes will amount to 1 or 2 drams. The urine is usually cloudy, which is due to shreds of muco-purulent matter and masses of epithelium from the prostatic urethra. In making a diagnosis from cystitis the urine should be passed in two portions. In prostatitis the first portion will be cloudy, while the second portion will be clear. This taken with the prostatic discharge, the tenderness of the gland on examination per rectum and the symptoms of mental depression make the diagnosis clear. In doubtful cases a correct diagnosis can be made with the aid of the cystoscope and by microscopically examining the prostatic secretion obtained by massage.

The cause of chronic prostatitis is not always a result of the acute form, or from gonorrheal infection, although about 75 per cent. of the cases are caused by gonococci infection.

"It has been proven by various pathologists that the prostate is the chief abode of the latent gonococci. These germs are first deposited near the meatus in a medium and locality most favorable for their development. They multiply very rapidly, work their way along the urethra, and in spite of all measures to prevent it, to the prostatic part; thence directly into the ejaculatory and prostatic ducts and follicles.

"The orifices of these ducts offer no resistance to the passage of the germs into the channels of the prostate and ejaculatory ducts, where they become hidden within the follicles of the gland and are thereby protected from destructive agents as applied through the urethra by the usual methods. The course

is also an open one to the seminal vesicles and vas deferens, to which they frequently gain access.

"When the gonococci have entered the prostate, they begin the secretion of toxins which at first cause acute, sub-acute, then chronic inflammation of the follicles and ducts, and subsequently parenchymatous affection of the entire gland."

The middle-aged man presenting himself with symptoms of prostatic disease and in whom an enlarged, moderately hard, and tender prostate is found, may or may not remember a gonorrhea occurring during his years of indiscretion. If he does recall it, it is with the belief he was entirely cured of his malady—many cases of this variety, which are interstitial,—as the chronic inflammation is developed so insidiously that the patient's attention is not directed to the condition until many years after its inception. But such a condition is a foundation for a senile hypertrophy in later life.

Too frequent hyperemia leads to congestion and stasis, which is followed by inflammation. Prolonged sexual excitement without gratification is the most prolific cause of prostatic hyperemia. Too frequent masturbation and sexual excess will also produce it. The lithemic, rheumatic, and gouty individual—especially if he is a high-liver and indulges in alcoholic beverages—is more liable to suffer from this affection. The so-called hypertrophy of the prostate gland differs from prostatitis inasmuch that it appears in advanced age, that it generally is not painful or sensitive to the touch. The enlargement acts as a mechanical obstruction to the free flow of urine from the bladder, thereby causing cystitis, residual urine, dilatation of the muscular walls of the bladder, frequent micturition, and often retention. Other sequels of the obstruction to the passage of urine are urethritis, dilatation of the ureters, pyelitis, and nephritis.

In our diagnosis we should carefully exclude tuberculosis, and cancer, vesical tumors, strictures, and vesical calculus, atony, paralysis, and cystitis.

The diagnosis of congestive enlargement from hypertrophy is many times difficult, although important. From my own observation, based upon the results of the treatment employed, congestive enlargement of the prostate is much more common than has heretofore been considered. Many of the cases diagnosed as hypertrophy and not so amenable to treatment other

than operative, have recovered to such a degree as to be relieved of the troublesome symptoms and subsidence of the enlargement. In support of my belief that supposed hypertrophy is congestive or chronic inflammatory enlargement, I will quote a few authorities. Lydston says:

"Diffuse inflammation with considerable enlargement of the prostate in men of middle age is probably due to long-continued chronic glandular inflammation or chronic hyperemia. That chronic diffuse inflammation is the foundation for many cases diagnosed as hypertrophy of the prostate the author is firmly convinced. He also believes that chronic hyperemia or inflammation may be the foundation of hypertrophy."

Dr. Geo. Whitefield Overall says:

"The idea, so generally prevalent among the profession, that when a man past forty or fifty has any disease of the prostate it is indurated hypertrophy, is erroneous. He thinks it somewhat analogous to the congested and inflamed condition of the uterus and its appendages. Not every woman that has a venous stasis and an inflamed womb has fibroid tumors developed within its walls. The latter is rare in comparison with the number of cases of the former. In like manner, fibrinous tumors or hypertrophy of the prostate is rare as compared with the numerous cases of congested enlargement."

The late Dr. Gross expressed the view that "prostatic hypertrophy might result from habitual enlargement of the organ incidental to protracted and repeated sexual intercourse."

Thompson says: "Enlargement of the prostate occurs in one out of every three individuals at middle age." He thinks chronic congestion and inflammation do not produce genuine hypertrophy but they do cause hyperplasia.

Treatment.—A year ago last June I attended the Symposium on Surgery at the American Medical Association meeting. Prostatectomy was the subject under discussion. After an excellent paper upon the subject had been read by a well-recognized surgeon, another surgeon fully as prominent, jumped to his feet and tore the method, technique, and the author into small pieces. Several other men, known all over the country, discussed the paper, and there was barely any two who agreed. At the close of the meeting a fine-looking old gentleman, who sat by my side, remarked with a sigh and a

shake of the head: "Not a very promising outlook to a man with an enlarged prostate who is contemplating an operation."

When we hear of the operation being performed in three or four minutes it seems nonsensical to think of any other treatment, yet from the most favorable route and the most perfect technique there are only about 30 per cent. good results. I do not advise against prostatectomy, for in certain conditions it is *the* remedy, and the earlier the operation is performed the better will be the results. But it is an operation a man shrinks from and delays until his condition is such that he cannot longer defer it, when life becomes a burden or he has complete retention will he submit to operative measures.

At the present time there is much written upon the subject, pro and con. Many very good men wishing to call a halt to the too ready knife write against operative methods of all kinds, claiming the mortality to be high and the results extremely unsatisfactory, leaving a worse condition than before the operation, causing incontinence, or frequent desire to urinate, or they are still obliged to use the catheter, or they may have dribbling from a fistula, or even passing fecal matter through the urethra. But what do these conservative gentlemen advise in place of operative measures? There is nothing in drug therapy they can offer. If there is existing vesiculitis they employ massage, but their main reliance is that time-honored, germ-carrying instrument, the catheter.

I heard Dr. John B. Deaver say last June, at the discussion on the subject: "That the catheter is infinitely more dangerous to the prostatic than is the operation"; still the poor patient prefers to wield the catheter until his bladder and kidneys become infected and die a natural (?) death rather than pad the records of the enthusiastic young surgeon. Catheter life at the best is a miserable existence, and any degree of safety from infection lies in eternal vigilance.

There is a period in a man's life, generally from forty-five to fifty-five years, when he begins to realize that the nights are too long or his bladder is too short, for he is obliged to arise once, twice, three, or four times to urinate; that the stream is smaller and starts slowly with more or less straining, with dribbling at the close of the act. He urinates oftener by day, especially if he indulges in any stimulants or dines too heavily. These symptoms with many others make him

realize there is some trouble at the neck of the bladder. He consults his physician who tells him, as he has told the good wife who has missed her menstrual periods a few times, "it's your age, there is nothing to be done now," you must wait. Why wait until the gland increases to a size which causes obstruction? Why not put out the fire in its incipient stage rather than wait until it becomes a conflagration? The patient should be treated in the congestive stage, when a cure can be assured in nearly every case. By this method we usually avoid the urethral route, as the passage of any instrument is liable to set up additional inflammation or infection. Fortunately the gland is so readily reached through the rectum that it is seldom necessary. This form of enlargement is most readily influenced by the static wave current. This modality was first used for this particular disease by Dr. Wm. Benham Snow, of New York. Dr. Snow says in his work upon static electricity: "The intensity of this current is remarkable in its effect upon local congestion and hyperemia, and the elimination of inflammatory exudates." No current administered in therapeutics so universally pervades the tissues of the body as this rapid vibratory current. It immediately passes through the body in every direction, producing a pronounced constitutional effect, but its most intense action is upon the tissues adjacent to the electrode. With the intelligent use of this current there is no pain, but an analgesic effect which is due to its action upon inflammatory conditions. The current is perfectly under the control of the operator by means of the spark-gap and controller. The guide as to dosage is the degree of contractions produced, avoiding any unpleasant or tetanic muscular contraction, but crowding it gradually up to the limit, in order to contract the blood-vessels and deplete the tissues to the fullest extent.

In the large congested prostate this form of treatment is a specific unless there is some complication existing. The earlier in its history the disease is treated the quicker and better the results, is true of this method as in the treatment of other diseases. Relief can also be obtained in nearly all cases of uncomplicated hypertrophy of the prostate. The treatment would be contra-indicated where there is any growth in the gland, or urethra, any pus formation, tubercular or malignant disease.

Where the bladder has become dilated with more or less residual urine, as a consequence, the effect of the treatment is apparent in a comparatively short time. Although a complete cure of these cases may not be effected, the muscular tone of the bladder is restored to such an extent as to correct any cystitis caused by residual urine. When the case is of long standing and the gland very much enlarged, the treatments should be given every day when possible, until the sensitiveness is allayed and the gland is sensibly reduced in size. Daily applications for two or three weeks will usually mitigate all the symptoms. One patient, seventy-four years of age, whose prostate was enlarged to the extent of causing stenosis of the rectum with resulting constipation, was obliged to arise every one to two hours at night and could urinate only after much exertion and walking about. Whenever he became chilled or caught cold, he was obliged to use the catheter, the residual urine was from two to three ounces, ammoniacal and containing some pus. The stream came very small with much dribbling. Digital examination revealed the gland so large I could not sweep my finger around it, and there was also great sensitiveness to the touch.

The treatment at first was given every day until the tenderness was allayed. This occupied about ten days when the strength of the current was increased, and three applications per week given with the result that in six weeks' time the gland was reduced to less than half its former size, and the patient arose only once or twice at night, urinating without effort. The urine became clear, slightly acid in reaction, with no perceptible amount remaining in the bladder. The health, which had become reduced from loss of sleep and general disturbance, became much improved. It is now a year and a half since he received any treatment and his general health remains better than for several years, his prostate and bladder troubling him very little.

With modifications to suit the indications of each case, I follow the technique of Dr. Snow. The long straight metallic rectal electrode is attached to the positive pole of the static machine, while the negative is grounded. My experience coincides with that of Dr. Snow, to use a low rate of interruption—from 200 to 300 interruptions per minute. "This will allow pauses between the periods of contraction, permitting a de-

gree of relaxation during the process of treatment. If the higher rates of interruption are employed the gland is held in a state of tonic contraction without permitting the intervals of relaxation." It is best to begin with a short spark-gap, just enough for the patient to feel a slight vibratory impulse; if there is any pain the spark-gap should be shortened. Treatments are continued for twenty minutes.

I do not claim that senile hypertrophy can be cured, but many of these poor sufferers can be made comfortable without being tied to the catheter, although I would advise prostatectomy when the condition of the patient is favorable for that operation.

In fibroid hypertrophy of old men, especially with enlargement of the so-called median lobe, I begin treatment with the continuous current. I place the negative electrode in the rectum against the under surface of the gland, the positive electrode 6 x 8 inches in size is placed over the bladder, a current of 5 m. is used to begin with, this is gradually increased to the tolerance of the patient for ten minutes, when the current is slowly reduced to zero, and the patient is allowed to rest for five minutes, when another application of the same duration is given. This softens and depletes the hardened gland and causes absorption of the hyperplastic tissue. Old men will bear much stronger currents than young or middle-aged men, as the sensibility of the gland becomes lessened by age.

On alternate days I give the rectal wave current, which serves to relieve the venous stasis, and stimulates the general circulation in those parts. As there is usually more or less dilatation of the bladder with residuum of urine, I use a rectal electrode with a long curve which is insulated within two inches of the distal end, this is passed upward and under the bladder and prostate. A spark-gap of not more than three inches should be used and the rapidity of the interruption should not exceed 300 per minute. It is gratifying to note the relief and improvement in these heretofore intractable cases.

This method does not conflict with any constitutional treatment or irrigation of the bladder when indicated. There is no pain or danger caused by the application when the proper technique is observed. The patient can continue his usual occu-

pation. The general tone and vigor of the system is benefited by increased metabolism.

Once more I will reiterate the advantage of treating the patient when possible in the stage of congestion or inflammation and not let the gland go on to induration and other pathological changes; also, the selection of the proper cases for this method of treatment and the relegation of the operative cases to the surgeon.

In treating sub-acute and chronic prostatitis, I always keep before me the advice of Sir Henry Thompson: viz., "Remember that the introduction of an instrument is more or less of an evil, never to be resorted to unless a greater evil be present which the employment may probably remedy." That is a maxim we should always remember in treating all diseases of the bladder and prostate. Many an old chronic trouble is lighted up into a fresh attack by stirring up the toxins into a real sepsis, by the passage of a sound, catheter, or electrode.

In all of those cases where there is active hyperemia or inflammation causing irritability at the neck of the bladder, frequent desire to urinate with tenesmus, possibly some gleety discharge, pain in the back and perineum, and all the nervous sensations accompanying this distressing disease, we cannot be too careful in our selection of remedies, as the lightest manipulation and the most careful treatment is liable to set up additional irritation. Consequently in the treatment of this condition I have found no remedy which equals the therapeutic application of the 500 C. P. incandescent lamp. This form of radiant energy penetrates to the deeper tissues, dilates the capillaries, relieving the hyperemic and congested pelvic organs, and the tension upon all of that extensive network of sympathetic nerve filaments. The full power of the light should be used for twenty to thirty minutes daily until the more active symptoms have subsided. I distribute the treatment over the suprapubic region, treating the inguinal glands and lymphatics, the perineum, and across the lumbar and sacral regions.

The light should be applied as closely to the surface of the body as the patient can bear in order to obtain the necessary penetration.

In the course of from one to two weeks, depending upon the severity of the case, I alternate the treatment every other day with the glass vacuum rectal tube, connected to the posi-

tive pole of the static machine, grounding the negative as with the wave current. As there is usually co-existing seminal vesiculitis the tube should be long enough to reach the vesicles. As the patient improves, the treatment can be continued with the rectal wave current, using the long or curved metallic tube in order to reach the seminal vesicles as well as the prostate, being always careful to use a mild current in these cases.

I could cite numerous cases to illustrate the benefits of this method of treatment, but I have already occupied too much valuable time. For obvious reasons this subject is of more than passing interest to us all—or nearly all. I think Thompson underestimates the frequency of enlargement of the prostate when he says that it “occurs in one out of every three individuals at middle age.” I will not ask for an individual opinion or a rising vote on the subject, but I shall hope for a general discussion.

Discussion.

Dr. Massey: I had some experience in this matter about eighteen years ago, I think. A patient, a gentleman about seventy, was placed under treatment. During the course of the treatment an insulated copper or brass electrode was used within the urethra and carried to the region of the prostate, and the other pole (positive) to the abdomen. After one of these treatments, I do not remember how many preceding, the old gentleman failed to return to the office, and I heard he was sick, which was rather disconcerting. It was not until possibly a year later that I met the patient on the street, looking quite well, and I asked him how he was. His reply was that “he was well and cured.” The treatment, he said, upset him somewhat at first, but for some time he had had no trouble. I felt quite elated over this case and wrote a paper on the subject, which I later regretted, for the experience has not been duplicated. For another patient I prepared a long-curved silver electrode, gold-tipped, and began to use gold-mercury cataphoresis to the prostatic urethra. The treatment was interrupted by an attack of cystitis, and there was but little benefit. It was discouraging, and I think to-day any urethral treatment is risky. My usual treatment of such cases is a recto-abdominal application of swelling currents, with the rectal electrode pressed against the prostate, using fifty or sixty ma. for a few moments, negative, followed by the primary faradic, and patients have been benefited. Altogether I have not seen a great deal of benefit. Recently I have used the wave current in a case and feel that the patient did as well as any I have had. I want to commend the paper,

and I think there is quite a future for this method of treatment with the wave current.

Dr. Johnson: This is an exceedingly interesting subject because it interests so many men in their advanced years. Various electrical modalities are used in the treatment of the hypertrophied prostate. My experience has been confined to the use of high-frequency currents, applied with Snow's electrode per rectum, where it is brought in direct contact with the prostate. After four or five applications the prostate loses its board-like consistency and becomes soft and patulous. As the treatment progresses it gradually diminishes in size. Another feature is that the constant feeling of discomfort is relieved from the first treatment.

Men in their forties or fifties stand a surgical operation well and operative measures should be used in these cases. We have a large class of men well along in their sixth or seventh decade with weak hearts and worn-out nerves with senile decay well marked; whose lives have become a burden from frequent and painful micturition. This class of men are poor subjects for an operation. Some survive the operation for a short time, but with their weakened vitality they sink and die. This class can be wonderfully relieved and their remaining years rendered comfortable.

As an illustration I will mention a single case:

An old gentleman of seventy-nine years; an active business man, who during the last ten years had had frequent attacks of prostatic hemorrhage, the prostate was smooth and hard. After the use of high-frequency treatment for two weeks the pain was gone and the prostate quite patulous. I had previously found 3 to 5 ounces of residual urine. One afternoon he had been out riding with his family for two hours and on his return he came in for his treatment. He went and urinated. I catheterized him and there was but a few drops of urine came away. The urinating function was quite restored.

Dr. De Kraft: There is a large class of cases that come to us complaining of articular rheumatism, where, if you will examine the urine, you will find there is frequently pus and upon examination of the prostate will find the prostate swollen, and some pus can be found in the urethra by pressing on the prostate with the finger in the rectum. This class of cases can be speedily cured by a mild wave current applied directly against the prostate. The swelling of the prostate subsides, and with it a great many of the other symptoms disappear. Also we have seen enlarged testicles where simply reducing the size of the prostate reduces the size of the testicles and gives the patient much relief.

Dr. Snow: It does not seem to me that there is any class of men as to age to which this affection is limited. Since I have been treating these cases, I have been very much im-

pressed with the frequency with which it occurs in young men. The fact that a man at sixty or seventy begins to show grave symptoms, is no sign that he has not been affected for twenty-five or thirty years; and while in these old men we are apt to find a hard enlarged gland the tissues of which are in a hyperplastic condition, in the young we are certain to find the gland if enlarged in a state of infiltration only. The early discovery of the condition and early treatment, insures the removal of the condition before it becomes organized. The early discovery of the condition is, therefore, incumbent in order to anticipate the later conditions, which I believe in the future will be eradicated in most cases by intelligent investigation and treatment.

The first case that was ever treated by me by the method described by Dr. Pitcher, was a man sixty-three years of age, and in a hopeless condition from the usual point of view. He spent the whole night in his chair, as he would otherwise be compelled to arise to void his urine. Mentally, the man was on the verge of insanity, threatening to take his life. I had been led to recognize the effects of the wave current in other conditions of congestion and infiltration, and on general principles considered it applicable to these cases, but was greatly surprised at the promptness with which the remarkable improvement took place. Within three weeks he was cured by the application of a straight metal electrode to the gland, employing twenty minute applications of the static wave current with a spark-gap at first of one inch and never more than five inches. This patient has been constantly under observation for the last six years and there has been no recurrence or farther enlargement, and he has not been compelled to rise at night to void urine, which is evidence that a man well advanced in years is capable of being cured by this simple method. I think of Dr. Johnson's remarks that if this method is applicable to old people who are too feeble to consider operation, it is applicable to all but tubercular or malignant cases, and under no condition should an operation be considered until methods which have proved as effective as this one in 90 per cent. of the cases in which it has been employed, has been first tried. There is no doubt in the minds of those who are familiar with the method described by Dr. Pitcher that operative methods in the future will ultimately be limited to a very small number of cases.

Dr. Eaton: A man came to me with carcinoma of the rectum and had been to a physician in Boston and pronounced incurable. I gave him treatment with the constant current, the negative pole internally varying from 10 to 15 ma. He did not state to me anything about bladder disturbance at the time, but as he began to get better he asked me if this ought to help him in the passing of his water. I replied that I thought

it would, perhaps cause some diminution of the disease. The man is still living, was in my office yesterday, passes his water about as well as he ever did, and is in a far better condition of health than six months ago. In another case a man had been operated upon for hemorrhoids and later found a recurrence of the old trouble. He came to me for electrical treatment. I have used the constant current in the hemorrhoids and with very excellent results. A little later he told me how much he was improved in the condition of urinating. He was in the office Saturday, tells me he is entirely free from the urinating trouble. I had not seen him for some six weeks, and he considers himself practically a well man. In these two cases the negative pole internally with from 10 to 15 ma., a copper electrode used well up against the prostate gland, and a large indifferent electrode perhaps six or eight inches square.

Dr. Slaughter: Something was said about polarity in the treatment in the cases. Dr. Snow said he was almost a faddist on the prostate gland, and I must confess I am completely so. With the limited experience I have in Virginia, the majority of the cases I think we can relieve by the Morton wave current. If we merely relieve the symptoms they are very likely to return, and I think if we would look more thoroughly into the permanent causes of a great many of reflex conditions, we would find them arising from prostatitis.

Dr. Strobell: As we are here to profit by an interchange of ideas and practical observations, I wish to report an unpleasant effect from an unduly prolonged application of the high-frequency current to an enlarged prostate.

The man had but recently recovered from a severe attack of acute prostatitis; and was under treatment at my office for the resolution of the remaining inflammatory infiltrates.

In addition to, and following the daily application of, the rectal vacuum tube, I had injected a 2 per cent. argyrol solution into the bladder to resolve a remaining irritation at the bas fond. Séances had been of fifteen minutes' duration. On this occasion, however (sixth treatment), the séance had been prolonged five minutes longer than usual, but not intentionally. The patient mentioned some slight discomfort, and thought a shorter séance would be more agreeable to him.

I now proceeded to introduce the argyrol solution into the bladder when I found an acute urethral spasm. For, although the caliber of the cannula of the urethral syringe was a No. 8, French scale, I could not by any possibility pass it farther than the penile portion. Beyond was a spasmodically closed passage.

The next day, however, with the séance reduced to ten minutes, all went as usual.

Two important facts are here accentuated. First, that exact dosage is essential in the application of these potent currents;

and, second, that we have, in this instance, a most important demonstration of the therapeutic potency of electric currents in general, and of the high-frequency, high-potential current in particular.

Dr. Gibson: This is a very interesting and a very big subject. I believe the Doctor stated in his paper that he found senile hypertrophy more than any other condition in old men. In the treatment of cases of hypertrophy of the prostate I do not think there is any means equal to the Morton wave current.

In those cases in which we get complications as acute inflammation of the prostate, we would not expect the same benefit from the use of the Morton wave current. I want to thank the Doctor for this splendid paper. I think the medical profession should be impressed with the importance of the effect of electricity upon the ordinary senile hypertrophy, and, as Dr. Pitcher suggests, why wait until too late before using it?

Dr. Nealy: I have been treating prostatic diseases for twenty-five years, and up to the time I began using electricity for this trouble I was having pretty good success, saving my cases without an operation. I only lost a few cases, but it seems to me that there are not so many more than there are to-day. I used the electrical treatment with all the modalities in six cases, and find that some improved and some did not. I believe that anyone can use electricity without improvement of the condition in cases of that character, but I do not believe as a rule it does very much good directly.

Dr. Geyser: I missed a good portion of the paper by Dr. Pitcher, for which I am very sorry, for I know Dr. Pitcher is capable of presenting a paper upon the subject of prostatic hypertrophy.

I would, however, with the permission of the president and the association, beg your indulgence for a few remarks with reference rather to the discussion that I listened to, than to the paper itself.

In listening to the discussion I was most forcibly impressed with the statements of various speakers, nearly each one having used some different modality in either the same or similar conditions.

The last speaker, however, summed up the whole situation by stating that having used a certain modality upon all his cases, some got well and some got worse.

Knowingly or unknowingly, the results showed that the particular modality employed was suitable in some of his cases and contra-indicated in others. This should teach us an important lesson: Know the pathological condition that has taken place, know the physiological effect of any modality indicated; then by the selection and proper application of the indicated remedy to the patient and not merely to the name of his

pathological condition, you have every reason to expect favorable results.

In my experience in the treatment of chronic prostatitis, there is no one agent, but all the various measures known to physio-therapy are at some time or other indicated. It is in the judicious selection at the proper time of these agents that we find such satisfactory results. Know the effects of your agent, treat the patient, and you will be rewarded with success, otherwise you are not entitled to results.

Dr. Titus: The remarks made by the speakers upon this paper have brought to my mind several thoughts to be suggested to those of us who are using the different methods of physio-therapy, and emphasize the necessity of the different therapeutic measures. We have heard much of the Morton wave current and the high-frequency currents. To those who are not familiar with the character of the two modalities it does not convey anything. All currents may be of high frequency except unidirectional currents generated by the high potential static machine.

From the Morton wave current we obtain distinct deep tissue contraction, or, as Dr. Snow aptly styles it, "tissue gymnastics," which induce circulatory drainage and re-establishment of normal function. In the employment of the vacuum electrode in administering high-potential currents from the static machine we have, together with the deep tissue contraction alluded to, the added efficiency of the actinic action of the vacuum tube discharge, together with the production of nitrous acid and ozone on the surface of the tube where it comes in contact with the parts, and which is driven into the tissues to the depth of from two to six mm. by the high potential. With the discharge from the coil in exciting the vacuum tubes we have illumination and heat only, there being an absence of all deep tissue contraction which is so important in the application in the remedial effects of these modalities.

The differences in the above effect are due to potentiality. It was accepted at a meeting of this society two years ago that currents of high potentiality and low frequency penetrated the tissues, while those of a higher frequency failed to penetrate the skin and passed over the surface of the body.

One observation I wish to mention in discussing Dr. Pitcher's paper is the efficiency of the application of the wave current to the prostate gland in determining the presence or absence of tuberculosis or malignant diseases, the symptoms of these conditions being always aggravated by the contractions produced in the parts by this high-potential current.

Dr. Brinkmann: This has been a most instructive paper and a most instructive discussion. We have learned lots of things, as we can in the discussion of any paper, but do not always learn them as from this paper. Several of the speakers have

spoken to the point, the treatment of the condition. Why did some men get good results from the application of a certain measure and other men did not? Because they are not treating the same condition with the proper agent. We must think of the prostate which is simply congested; we must think of the second point, where the stasis has allowed the deposit of plastic material. That organ is slightly changed. If we can dissolve the plastic material, we can cure that organ in the strict sense of the term; but if a hyperplastic condition is present we cannot hope for that result from the application of the wave current. We must do something more definite on account of its occupying space, on account of its breaking down the hyperplastic tissues and again making them soluble. By such a procedure we get results from the solution as well as from the removal of the neoplastic substance. When the change is slow that causes the old blood which is stagnant to be worked out and allowing the fresh blood to get in, then the results are slow. Take the exceedingly advanced cases, and then let us suppose that we apply such a thing as the high-frequency electrode, to one whose tissues were hard, and we get exactly what one of the speakers stated; and so also, possibly, of the cases of the spasm of the urethra.

What I am surprised at, was that any vigorous application had been made, and in the use of that agent, which is a very common thing. People should not use dangerous agents without knowing what they are doing. Now let us derive something from these discussions. We must study the conditions and fit our treatment to them.

Dr. Pitcher (closing): I want to thank you for the enthusiastic reception of my paper. There is very little to say in return. I would like to say that in the treatment of young men, what I mean by young men are those over twenty-five years up to seventy. Of course an enlarged inflamed prostate in a young man is in all probability due to gonorrhea. I would take a little time to cite a case which came to me this summer. A gentleman forty years of age had been away from home six months. After his return he noticed a discharge from the urethra and quite an active inflammation, which made him think of the gonorrhea he contracted about twenty years ago. When he came to me he had been using an old prescription of twenty years ago, but the trouble seemed to increase. It was difficult for him to sleep. He had been to a physician who had tried to stretch an old stricture which he did not find. I did not examine him for any stricture. I examined the prostate and found it about the size of an orange. I did not try to use any treatment except the five hundred candle-power incandescent lamp which is about all you can use in these cases. This gentleman was so generous that he accused his wife of giving him the trouble, so that brought her into the office

for an examination, but there was no disease existing with her. During all that time of twenty years that old chronic prostatitis had been in abeyance, and when he returned home the prostate received some active exercise. Consequently he stirred up an active inflammation, which the physician who used the sound had increased. In about two weeks I reduced the inflammation with the light so he could bear the high-frequency current from the static machine. I was so very careful not to increase any existing trouble that I used the high-frequency current until the gland was reduced, I should judge, all of one-half its former size. The patient was very much relieved, could rest nights, and could urinate without trouble. Then I used the wave current until he recovered completely. But what I would like to emphasize is in trying to use any urethral treatment where there is active inflammation. I tried to illustrate in my paper the different pathological conditions and to treat them accordingly. I was going to speak of a surgeon whom I saw a week ago; he told me that every operation he performed for prostatic hypertrophy, he was less sure of ever performing another one. He became more decided with reference to the operation, because he had two cases die lately when they were promising cases. I think if the profession will give this method a faithful trial, they will not only find it a satisfactory treatment but free from any danger.



CLINICAL OBSERVATIONS IN THE TREATMENT
OF PROSTATITIS.

BY ROBERT A. BLACK, M. D., VIRGINIA HOT SPRINGS, VA.

During the career of the average general practitioner many cases have appeared before him for treatment in which the main symptoms, as expressed by the patient, are those of a general "tired out" feeling and the inability to perform any work or pleasure, requiring exertion, without great fatigue, and with the idea firm in his mind that a rest from business, with outdoor recreation, will restore him to health.

How often has the same practitioner traced the trouble to the prostate, either in an infected or non-infected condition? In the first instance attention is quickly drawn to a definite diagnosis by the fact that the patient gives a venereal history; while in the latter he is misled simply because the patient does not or will not be willing to admit that his trouble is located in those organs—a sort of mock pride. Then, again, the patient may not suspect it, because prostatic trouble does not come on suddenly, but in an insidious manner; the fact that he does not fully empty his bladder, as when younger, being attributed to a cold or some past excess. The effects of which he thinks will effectually pass off. So it may; but only to return, and finally not to pass off, but to remain with a persistence that causes him considerable alarm. Then it is that he calls on his family physician, who too often will only suggest some diuretic, which may or may not relieve him for a time. If he has indulged in various foods or alcoholic drinks which render the urine excessively acid, he ascribes that as the cause and resorts to some "lithia" water, at the same time refraining from over-indulgence, thereby effecting what he terms a "cure," being in total ignorance of the fact that catheterization would find residual urine.

He may ignore all medical advice, but consults with his personal friends, who, as a rule, claim to have had similar trouble, and between them they "treat" each other.

If the case be an infected one the patient will have symptoms sufficiently prominent to prevent any doubt in diagnosis, and the fact that he may have a discharge, more especially in the morning, causes him to tell everything and quickly.

It is the treatment that so frequently bothers the medical man, for he is apt to feel that the case must go to the specialist or surgeon unless relief is soon effected. Such has seemed to be the case in the past, but now relief can be obtained through a non-surgical treatment which has been remarkably successful with cases treated by the writer, who feels that his experience has been such that it should prove interesting and instructive to the general practitioner and his patient as well. To be sure, the writer has at hand the baths which have a wide reputation in the successful treatment of rheumatism, gout, nervousness and allied disease. Their effect in eliminating (without aid of internal medication) pathogenic elements is so beneficial that the patients promptly feel the result. In addition to these the climatic advantages of the Valley in which the springs are located add a tonic effect. The other part of the treatment, one which reaches the seat and cause of the trouble, is the local application of the static wave-current or vacuum electrode directly to the prostate gland, by Snow's method.

Dr. Wm. Benham Snow in his work on "High Potential and High Frequency Currents," regarding the "Static Wave Current," says: "Both local and general, the actions of this current are remarkable. The vibratory influence and recurrent intervals of contraction induce mechanically an activity of the end organs beneath the electrode stimulating secretion and excretion and tissue building to a marked degree and without harmful effects. Locally, conditions of stasis and stagnation are overcome, promoting restoration to normal conditions where stasis has been present."

To also use his words regarding vacuum tubes: "The effects on local metabolism are largely due to the induction of muscular and tissue contraction and the vibratory influences, coincidently affecting local stasis and congestion. The effects are most marked when the vacuum electrodes are in contact with the tissues and the current is produced by direct connection with the static machine (with coil currents active contraction is not produced.) By this same means existing induration and infiltration are dissipated, the tissues become softened and the circulation is restored and local repair instituted. The same influence produces an increased elimination of the products of inflammation, thereby assisting the process of reconstruction. Congestion is relieved and restoration of ul-

ceration and indurated regions to a normal condition is effected, etc."

By this method in the infected cases the vacuum tubes have a strong contractile power and the rays from it exert a decided antiseptic and germicidal effect on the gonococci, which seem to make the prostate and vesicles their main resting-place, and there remain, throwing out toxins, to be absorbed by the lymph and blood vessels and propelled to various parts of the body, affecting it in different forms we so often meet as infectious arthritis and neuralgia. This, and the fact that when they are thus disturbed they seem to die, is the conclusion reached by those who have made experiments in this line. The following cases, of an infected character, out of many treated, will show the *modus operandi* and results from the same. As you will observe in most of the cases, symptoms of rheumatism are shown:

Case 1. Merchant, age thirty-three years. Consultation on June 24, 1907, for rheumatism in left foot, right hip and pectoral muscles.

History. At age of twenty-one contracted gonorrhea, discharge lasting for ten days. About three weeks after infection his knees and feet commenced to swell and for six months he was confined to the house with rheumatism. He received various treatments. The trouble seemed to remain in the lower extremities until April, 1907, when the joints of the right hand also became swollen and painful. About this time pain and tenderness also appeared in the right hip, and he experienced trouble in voiding urine, feeling that he had never fully emptied his bladder, as after the act there was (as he expressed) a "dribbling." He was disturbed at night, being compelled to arise three or four times to void his urine. Examination showed thickening of joints of third finger of left hand. Also of the second toe of right foot. There was tenderness (on pressure) over crest of the ilium, and extreme soreness over the sternum at about the 4th and 5th intercostal spaces, on slightest movement of pectoral muscles or on laughing. This area also caused him pain when turning in bed. Urinalysis was negative, digestion and appetite good. The prostate gland was considerably enlarged.

Treatment. Tub and hot pack were administered daily and after the fifth bath, gave him considerable relief. Also gave

treatment by Titus vacuum prostatic electrode fifteen to twenty minutes daily, from negative side of machine, making the application through the rectum directly over the prostate and seminal vesicles. On the eighth day the hip and chest tenderness had disappeared and he found that he could remain in bed during the entire night as the vesical irritation had ceased; he being able to fully complete the act of urination with no distress or inconvenience. On the twelfth day all signs of pain and swelling had disappeared. The treatment was continued for three weeks. Baths daily for one week, and five baths each week for second and third weeks.

Electric treatments. Daily applications of the static wave current as described for fifteen to twenty minutes each for first two weeks, and then every other day during the third week. When he left the patient said that he was in better condition than at any time during the past two years. At the time of consultation he complained of a "heavy feeling" in the eyes, which at times were watery and interfered with his sight. This condition entirely disappeared during his treatment.

Case 2. Retired merchant: Age forty-three. Consultation on September 1, 1906, for insomnia, and also for relief from being obliged to arise two or more times each night to void urine. Gave history of an attack of gonorrhea contracted twenty years ago in which the discharge ceased after two months treatment. Since then he had had trouble in completing the act of urination. Had had digital massage per rectum off and on for past 15 years for affected prostate. Was informed that he was impotent, as sexual ability had been absent for past two years. At time he called he was complaining of pains in both knees, which while not constant, became severe at times.

Examination. Urine normal, prostate enlarged but not at all painful to touch.

Treatment. Consisted of spout, tub and pack baths daily for first week and every other day for remainder of time. Also gave vacuum prostatic electrode per rectum from the negative side of the machine for fifteen minutes daily. After the third treatment patient slept all night without voiding urine and urinated only at normal intervals (also normal quantity) during the day. After the tenth treatment sexual ability was found to be restored, and on examination the prostate was

found to be of normal size. During the course of treatments, after the third the patient tested the power of the static current to relieve insomnia, by smoking a large strong cigar and drinking a cup of black coffee, in spite of which he slept. He took in all fifteen treatments which caused all pain to disappear, and they had not returned after lapse of ten months, notwithstanding lack of diet and care.

Case 3. A broker, age twenty-four years. Consulted me in May, 1907, for treatment of a urethral discharge, most marked in the morning and being compelled to arise during the night to void urine, which act was at times painful and difficult. Examination showed the prostate to be enlarged and there was a slight urethral discharge. Treatment by the static vacuum prostatic electrode by rectum (connected from the negative side of the machine) fifteen minutes daily. Discharge ceased after the eighth treatment and also the trouble in urination. He slept all night and the prostate was normal. Since then there had been no evidence of return.

Case 4. An electrical engineer, age thirty-five, called February, 1907, for treatment of a trouble in the right knee. He said that it "gave way" with him when tired, and previous to a storm, and claimed that it was caused by an accident some years ago, and the only relief he could obtain was from rest and hot applications and that that was only temporary. He had used all kinds of internal and external medication under advice of many physicians. He gave a history of repeated attacks of gonorrhea up to ten years ago, and also of a great perineal pain after intercourse which only very hot applications could relieve; besides occasionally having trouble in voiding urine. Examination showed knee slightly enlarged but in no way sensitive to touch. The prostate was sensitive and considerably enlarged.

The treatment consisted in spout, tub and pack baths to eliminate any latent trouble, and by vacuum prostatic electrode by rectum (negative pole). At first the patient could stand only about a half inch spark-gap without pain. By the fourth application a five inch spark-gap was used. At about this time he took a ride on horseback which caused pain in the prostate. About four treatments after this, or ten in all to this time, his prostate was found to be normal, and the trouble in his knee was no longer evident. After fifteen treatments he was com-

pletely relieved, having no pain on intercourse, and there has been no evidence of return for six months.

Case 5. A wine merchant aged twenty-seven, consulted me for extreme nervousness and general fatigue; also for pain in the lower (lumbar) part of the back and the right knee. He gave the history of a severe attack of gonorrhea six years previous and of having had his prostate treated by rectal suppositories and urethral injections as well as by digital massage. An examination showed no evidence of any trouble except in the prostate gland, which was enlarged and sensitive to the touch. The treatment consisted of a tonic (or douche) bath daily, and an application of the vacuum prostatic electrode with the negative static current per rectum for fifteen minutes daily. At the third visit a slight urethral discharge appeared which ceased after the seventh treatment. He had in all twelve treatments, which reduced his prostate to normal size and completely relieved him of his nervousness and pains in the knee and back.

Case 6. A student, age twenty-four years. Was consulted May, 1907, for severe pains in lumbar region of the back, with some pain in the left knee and frequent disturbance of sleep at night to void urine. He had been treated for enlarged prostate by digital massage through rectum, periodically, during the past four years, and gave a history of an attack of gonorrhea four years ago. Examination showed slightly enlarged prostate. The treatment consisted of the use of the Titus vacuum prostatic electrode, fifteen minutes daily through rectum as in the preceding cases. After the fourth treatment the pain in the knee disappeared, and pain in the back was lessened. The bladder irritation had ceased and his sleep was not disturbed. Immediately after the first treatment he said: "The parts feel stronger and tighter." Ten treatments reduced the prostate to the normal size.

Case 7. A telegraph operator, age thirty, consulted me for extreme nervousness, with pains in the left shoulder and also the right knee which first appeared about two years ago. He gave a history of gonorrhea contracted two and a half years ago, which discharged for three months, returning as he expressed it, with almost every act of intercourse. Examination showed the presence of a brachial neuritis, with no evident trouble in the right knee; the prostate gland was also enlarged

but not at all sensitive to the touch. There was no bladder irritation. The treatment consisted of daily baths of spout, tub and pack to eliminate the rheumatic elements. Also daily applications of vacuum prostatic electrode by rectum for 15 minutes each. Fourteen treatments were administered in all, with the result that the prostate became normal and neuritis disappeared and the general nervous condition was greatly improved.

Case 8. Broker, age thirty-three. He gave a history of restless sleep and extreme nervousness: had had gonorrhea a number of years ago. There was no discharge at present excepting a "morning drop," with some bladder irritation, and aching in the joints, not sufficient to "lay up," was operated on for prostate hypertrophy five years ago. Prescribed tonic (or douche) bath to tone the general system and allay the nervous irritability. Gave treatment by vacuum prostatic electrode, fifteen to twenty minutes daily through the rectum. Examination showed the prostate to be only slightly enlarged. After the sixth treatment the prostate became normal: "morning drop" and the bladder irritation had disappeared. All aching pains in joints had by this time also been forgotten.

Case 9. A clerk, thirty years of age, consulted me in March, 1907, for "full feeling" in the region of the bladder, and pain during and after urination and restless sleep. The history given was that in November, 1906, he contracted gonorrhea which continued with a profuse discharge and was lessened by injections and internal medication. About January 15, 1907, he stopped his treatment and the discharge started again. On March 11, 1907, the date of visit to my office, an examination showed an enlarged prostate and gonorrheal urethral discharge. Gave him daily treatments through rectum with the vacuum prostatic electrode, fifteen minutes each. After third treatment pain stopped and with the fifth treatment the discharge let up. At the tenth treatment the prostate was found to be normal. He had fifteen treatments in all, covering a period of three weeks, with the result that no evidence of trouble had appeared after a lapse of four months.

Case 10. A speculator, aged twenty-seven, consulted me in March, 1907, for painful and frequent urination, insomnia and extreme nervousness, and a history of repeated attacks of gonorrhea. At the time of the visit there was no discharge

excepting the "morning drop." He had had an attack of gonorrheal rheumatism six months previous by which he was confined to his bed for six weeks, both of his ankle joints being painfully swollen. Examination showed no trouble anywhere but in the prostate, which was considerably enlarged and very sensitive and tender on palpation. Treatment was given consisting of the baths daily in tub and hot pack; also treatment by static fifteen to twenty minutes daily with vacuum prostatic electrode. After the fourth bath and treatment pain (but no swelling) appeared in the left ankle and a urethral discharge was noticed. At the eighth day both the pain in the ankle and discharge had disappeared. On the twelfth day the prostate was examined and found to be normal. He then left my care to go home. Have since heard from him that he considered himself perfectly cured.

Case 11. A retired broker, aged fifty-two, consulted me in April, 1907, for slight enlargement of the second joint of both hands, also for trouble in retaining urine, or as he expressed it, "urine was slipping away from him." Gave history of repeated attacks of gonorrhea and frequency of urination, more noticeable at night, and also of stiffness and occasional soreness in the elbow and knee joints. Examination showed the joints of both hands thickened, the prostate enlarged, and a lack of freedom of mobility in the knees and elbows. The urine was excessively acid. Treatment was given daily with baths (tub and pack) which softened the joints and relieved the soreness, and also daily applications (15 to 20 minutes) to prostate by Titus vacuum-electrode. Also small sparks to the points with massage of the same. After the fourth treatment the trouble with the urine ceased. Twelve treatments in all were given. When he left, the pain in the elbows and knees had disappeared, the finger joints more pliable and greatly reduced in size.

Case 12. Wine agent. Age twenty-eight, April 5, 1907. He gave a history of having had gonorrhea, contracted nine years ago. He suffered once or twice each year since 1898 with painful attacks of orchitis. Relief from these attacks required one or two weeks in bed with local applications. He also complained of pains in the knees and ankles, and frequent urination. Examination showed the left testicle to be swollen and painful on slightest palpation. The prostate was enlarged and sensitive.

Treatment. Daily treatment (15 to 20 minutes each) with the vacuum prostatic electrode through rectum, using negative pole as in the preceding cases. At the third treatment the testicle began to decrease in size and by the sixth day it was normal. About this time a slight urethral discharge, which had started after the third application, disappeared. On the tenth day he said that he thought the affected "testicle was smaller than the good one." Fifteen treatments, which in all extended over one month, made a complete cure. The patient has been continually more or less on his feet ever since, without experiencing any trouble in knees, ankles or testicles.

In all the above cases the writer used a prostate vacuum electrode, designed by Dr. E. C. Titus, of New York City.

The following cases were non-infected in character.

Case 13. A merchant, aged seventy, consulted me on February 8, 1907, for pains in the lumbar region and general fatigue; also for frequent urination, which caused loss of sleep by compelling him to arise three to five times each night. Urinalysis was negative. Examination disclosed nothing but an enlarged prostate. Positively no venereal history. Treatment consisted of spout, tub and pack baths which greatly relieved his lumbar pains. Also gave him treatment through the rectum with the Snow solid electrode (wave-current) for fifteen to twenty minutes daily and sparks with large ball electrode over spine and legs. On February 15 (eighth day) he slept all night, as all distress at urination and all pain in the back had disappeared. He received treatment for ten days, when it was found that the prostate was reduced to normal. Three months later, he wrote to say that he had not lost any sleep by reason of voiding urine during night, as the bladder would retain it until he arose in the morning, and that he voided the normal quantity in twenty-four hours; and with the cure of the prostatic trouble his fatigue had disappeared.

Case 14. Merchant, age fifty, (widower). Consultation on May 9, 1907, for neurasthenia and general prostration. He declared that he could not make the slightest effort without fatigue and that he passed restless nights, mostly without sleep, and when he did sleep it would be only until about 4 A. M., he having retired at 11 P. M. Examination: Auscultation and percussion showed nothing abnormal. Urinalysis negative. The tongue was somewhat coated, due to irregularity of the bowels. The prostate was found to be slightly enlarged with a history of no venereal disease. He stated that he was awakened each night (about 4 A. M.) by an attack of priapism which could be relieved by voiding urine or by cold applications. Treatments consisted of tonic (or douche) baths daily,

and daily application to the prostate by solid (Snow) electrode per rectum (wave current) for fifteen to twenty minutes. After the fourth day he slept till 5 A. M., but no priapism. After the sixth day his sleep was not disturbed. This condition continued during the fifteen treatments. When heard from three months later he was sleeping through the night and his physical and nervous condition was apparently restored to normal.

Case 15. A book-maker, age thirty-four, consulted me in March, 1907, for persistent and daily attacks of priapism, which caused him so much annoyance that he was compelled to seek relief. Examination showed the prostate to be considerably enlarged and very sensitive to the touch. I gave him the wave-current for twenty minutes daily (the first day, morning and afternoon) with the (Snow) metal electrode per rectum. The sixth day cleared away all evidences of priapism, and twelve applications seemed to be all required for a permanent recovery.

Case 16. A merchant, age fifty-two, consulted me in February, 1907, for extreme nervousness occasioned by enlargement of the prostate, which had extended over a period of two years and for which he had had digital massage and various treatments. He was advised to rest from all business cares for at least one and a half years. Examination showed a normal condition of all organs excepting the prostate, which was enlarged. He was in continual pain, especially before the act of urination. He was compelled to apply hot applications each night, probably in all about two hours every night. There was no venereal history; but a rheumatic one. Treatment consisted of a tonic bath and application of the wave-current per rectum for twenty minutes daily for fifteen days. On the third day there was no pain until 8 P. M. On the sixth day it had entirely disappeared. After the eighth day he slept all night. By the end of the treatment he was completely relieved and examination showed a normal prostate.

The writer has refrained from speaking of the etiology and symptomatology because of their obscurity at times, and the fact that there is difficulty in proving the presence of gonorrhea in the older cases of chronic gonorrheal prostatitis or in determining the cause of many of the non-infected cases. The possibilities of the infection of women and the general spread of gonorrhea are so great, that any treatment or prevention, to say nothing of the relief to the male sex generally, of whom so many suffer from the affection in one way or another, should be heartily welcomed.

By these methods, not only are the conditions relieved, but the general tone of the system is restored, the sluggishness of the secretions are dissipated and actively awakened and followed by a return of appetite and general health.

The Homestead.

CANCER AND ITS TREATMENT BY CATAPHORIC
STERILIZATION.

BY G. BETTON MASSEY, M. D.,

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CHAPTER III.

(Continued from page 529.)

THE AUTHOR'S METHOD. What, then, are the conditions to be met in those cases where the wide-sweeping knife operation is inadmissible?

For effective results in such cases we must have a method that acts as quickly and thoroughly as the knife in a favorable case for that method, and yet is capable of application through the growth itself, from within outwards, enabling us to reach the actual periphery of the latter by a combined destructive and occlusive agency, devitalizing all cells *in situ* and sterilizing the outermost edge while at the same instant sealing the absorbents, thus effectually preventing operative reinfection. If the growth be within a cavity, this force must be conveyed along a conductor that is of small caliber and often tortuous, and the conductor must be capable of thorough insulation of the force when traversing non-affected parts, thus permitting the destructive effect to be directed and controlled at will. If this agency be also absolutely bloodless, and leaves as a product of its action sufficient antiseptic chemicals interstitially diffused throughout the growth, and in chemical union with its devitalized cells, to maintain an absolutely aseptic condition until the débris separates—it would seem to be a most valuable method where a perfect knife removal is impossible.

Not only are each and every one of these indications met by the massive diffusion of the ions of mercury and zinc by powerful electric currents, as devised and developed by the author during the past fourteen years, but still another result of value follows the production of such an area of necrosis coterminous with a malignant growth: for beyond this area of total necrosis the diminishing density of the diffused ions will produce a zone of sterilization of slightly further dispersion, sufficiently infiltrated with the ionized chemicals to destroy outlying latent cancer cells while only arousing the physiologic resistance of the normal tissues.

The basal facts developed by the author in the study of this process are that, in the utilization of the electrolytic and phoretic powers of a strong electric current for dissolving and ionizing zinc points or needles coated with mercury and thrust into the growth, a quantity of ionized mercury and zinc may be interstitially diffused throughout a tumor in a few minutes, with the patient usually under an anesthetic, that will be sufficient to kill all malignant cells and their accompanying germs, if the latter be present; and that by prolonging the process sufficiently these microbicidal substances will be driven further than the apparent boundaries of the growth in sufficient strength to kill outlying colonies and lines of dissemination in the immediate neighborhood, without serious detriment to the healthy tissues in this situation. In other words, while all tissues will be necrosed *en masse* near the electrode, producing an *area of total necrosis*, the diffusion may be so regulated and directed that a sufficient quantity will pass beyond the line of necrosis and kill outlying cancer cells without being more than highly irritating to normal cells, forming thus a narrow *zone of sterilization* beyond the area of necrosis.

The diagram, Fig. 1, illustrates what happens in a surface growth under a strong current with a free supply of zinc-

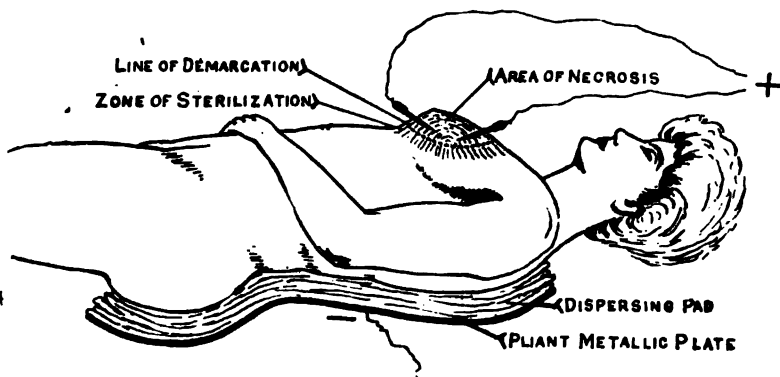


FIG 1.—Diagram of monopolar cataphoric operation in a case of cancer of the breast.

mercury points. The evident portion of the tumor will become shrunk, and softer, and will change in color to a grayish-white in from five minutes to one hour, under a current appropriate to the size of the growth, all living structures being

bloodlessly devitalized. The limits of total necrosis are sharply defined, and become later the site of the line of demarcation as nature throws off the dead material.

In spite of the employment of a current that will develop large quantities of ionized mercury and zinc and impregnate considerable areas with it, the general system of the patient is protected from the absorption of all but a minute quantity by reason of the sealing of the absorbents by the necrosing action of the metallic ions where densely diffused. None of that deposited within the area of necrosis can, therefore, be absorbed, theoretically, and clinical experience shows so little, if any, absorption after the most extensive operations that it is probable that the portion deposited beyond the line of demarcation comes away in the discharges during the process of healing, in large part. In fact, it has seemed to the author that the small portion of these antiseptic chemicals thus probably absorbed within the system and eliminated by the emunctories may account for the quick improvement in the general health after operation in cases showing a preoperative anemia without metastasis, though this improvement may really be due to the immediate destruction of the toxin-generating malignant cells.

The subsequent history of a growth subjected to the major application with strong currents is most interesting. On the completion of the application it will be noted that the whole mass of the tumor is of a grayish-white color, and that if odor has been present it no longer exists. All tendency to bleeding has also been arrested, of course.

On emerging from the anesthetic the patient experiences no pain, but considerable soreness. By the next day a puffy, reddened zone will be found surrounding the area of necrosis and occupying the situation of the zone of sterilization. This is somewhat tender on pressure. By the third day a tendency towards the formation of a blister is seen along the site where the line of demarcation will form, and when this line forms some days later a lead-colored, odorless serous discharge will appear and continue until the separation of the dead mass, the latter event occurring from seven days to three weeks from the date of operation. The cavity thus made heals quickly by granulation and cicatrization, and with a soft and comparatively small scar, there being none of the tedious delays and uncertainty incident to x-ray burns.

HOW THE METHOD WAS DISCOVERED. During the summer of 1893 the author attempted the treatment of an adenocarcinoma of the groin in a gentleman, at his request, destroying at first the mass of the tumor by ordinary bipolar electrolysis, and then changing the method to positive cauterization with a blunt electrode of carbon. But slow progress was being made under the use of currents of about 100 milliamperes applied daily, this strength being made endurable by the simultaneous cataphoric dispersion of cocaine solution from the cavity, when it was noticed that the carbon electrode showed signs of roughening under its repeated employment as a positive pole. It now occurred to the author that a zinc electrode would be better, since the materials formed by its erosion would assist in the destructive process. This had been either done or suggested in other diseases than cancer by a number of writers on cataphoresis, particularly Bautier of Paris and Morton and Cleaves of this country. A suitable instrument was accordingly fashioned from a Leclanché zinc rod and applied, without any appreciable change in the effect with the current strength used. As, however, the active surface of the zinc was found to be blackened and roughened by the formation of oxides from the contained ferric impurities of commercial zinc, it now occurred to the author that a free amalgamation of the zinc with mercury would be of the same value here as when the zinc is employed within a battery: i. e., keep it clean by reason of being coated with a layer of pure zinc in mercuric solution. The thought also arose, but distinctly secondary, that possibly the mercury could also be chemically changed and diffused with the zinc, though it was known that this did not occur within the battery. This was accordingly done, and with a hundred milliamperes turned on there soon appeared a whitish pellicle beneath and around the instrument, distinctly different from that following the previous use of the zinc. The next day the importance of the discovery thus made was evident when it was noticed that the unpleasant odor, which had begun to issue from the eroded cavity, had ceased, and that the area of induration on the side of the cavity against which the electrode had been applied was lessened. The method was now continued in this mild form with most notable effects, as detailed elsewhere,* and though the ultimate result

* Transactions American Electro-Therapeutic Association, 1900.

was not a cure in this case, enough was seen of the effects of the method to encourage further trial. It was not until the spring of 1896, and after the successful application of this mild method to one case of sarcoma of the palate in 1894, that the stronger method under an anesthetic was essayed, and again the results were most important, though first seen in a case that was then failing from internal metastasis.

The effects observed in this latter case demonstrated incontestably and for the first time that a zone of infiltration would form beyond the area devitalized by the more densely diffused chemicals, and that within this zone a reaction would occur, accompanied by a disappearance of malignant characteristics in this situation. A current of one thousand milliamperes was applied in a bipolar manner, several zinc-mercury electrodes connected together and to the positive pole being thrust into the periphery of the tumor, while the circuit was completed by a cotton-covered disk saturated with Fowler's solution connected with the negative pole and placed against its center. This resulted in the diffusion of zinc-mercury ions from each anode in the periphery, and of arsenic ions from the negative disk in the center. Areas of devitalization appeared in a few minutes in each situation, namely: a large one beneath the disk in the center, and smaller ones around each zinc-mercury electrode in the periphery, accompanied by a general shrinkage of the growth. After fifteen minutes the current was turned off and the patient put to bed. On removing the dressing the next morning I was surprised to find that the indurated tissues that lay between the small areas of necrosis had changed color from a purplish to a pink tint, and were puffy. Two days later this puffiness had largely subsided; and what had been an elevated, indurated, malignant-looking zone at the edge of the growth was now quite pink, flat, and devoid of malignant appearance. It was evident that *some material or influence had passed through this tissue, beyond the line limiting total devitalization, which was sufficient to destroy malignant cells while only acting as an irritant to the normal histologic elements.* The subsequent history of the case fully established the fact that at least a greater portion of these cells had been killed, for the tissue never regained its malignant characters, though this patient was finally carried off by the continued progress of metastatic deposits in various internal

organs that had been implanted some time before the application was made.

The discovery that pure mercuric ions could be produced and diffused from a gold instrument was the result of subsequent experiment, when it was found also that this diffusion was so rapid, by reason of the action being confined to the mercury, gold being unattackable, that it was necessary to devise some means of keeping the active surface of gold supplied with its mercury coating, even under a moderate current. This was finally done by employing tubular instruments made of pure 18 karat gold, through the caliber of which an excess of the quicksilver was injected with a glass syringe after the instrument was in position in the tumor.

(To be continued.)



Editorial.

THE IMPORTANCE OF THE EARLY RECOGNITION AND TREATMENT OF HIGH-ARTERIAL TENSION.

Recent investigations into the conditions arising from high-arterial tension and the prevalence of arterio-sclerosis, have placed it prominently before the profession as an etiological factor demanding consideration. The prevalence of arterio-sclerosis and what seem to be the effects of the condition, rather than the cause, the accompanying heart lesions, and nephritis, have led also to investigation as to the probable cause leading up to the degeneration of the muscular coats of the arterial system.

The solution of the problem as to whether this degeneration arises from a pre-existing condition of high tension, metabolic defects arising from other causes, or from poisonous toxins, seems to be the all-important question calling for consideration. From the investigations of Miles, in a recent issue of the *Journal of the American Medical Association*, who reports the results of systematic administrations of adrenalin to young rabbits, and other observations, it would appear that the alteration in arterial tension had much to do with the degeneration induced in the middle coats of the arterioles.

Arterial tension with the arterioles in a state of persistent contraction would seem to be the most rational explanation of the cause for interference with the metabolism and nutrition of the muscular structures of the arteries, as degeneration likewise takes place in the muscles elsewhere when placed for a long period of time under constant tension, or contraction. This suggests the importance of the investigation of the cause of such tension, which probably arises from some condition of unusual excitation of the vasomotor system, which may be due to the circulation of irritants, as of free alcohol or toxins in the blood stream, or to some influence, cerebral or spinal, causing a stimulation of the centers of the vasomotor system.

That increase of arterial tension affects individuals in varying degrees, and at ages ranging as a rule from thirty years to advanced life, points to its significance as a factor of health that should be considered during all periods of adult life. What may be considered normal blood pressure, or normal tension, varies in its range with what may be considered health, from a tension that would support a column of mercury, as measured by the sphygmomanometer, 100 to 135 millimeters in height, indicating that the tension above or below this range is a condition of abnormal blood pressure. The employment of means or measures which will promote the elimination of toxins as the administration of radiant light and heat baths, or which will in any other way promote general metabolism, as the employment of the static wave current or light, or which will act directly upon the blood pressure as d'Arsonvalization or a combination of these measures, together with the judicious regulation of diet and exercise, will act as a prophylactic in early cases, and relieve the impending dangers in advanced conditions of arterio-sclerosis.

Observations and investigations show the remarkable effect of auto-condensation as employed with the high-frequency currents, administered according to the methods of d'Arsonval, to be particularly effective in lowering and maintaining within the range of safety the arterial tension. That the current applied in this way has a profound effect upon blood pressure, employed with 300 to 400 milliamperes, as measured by a hot-wire meter, is well attested by numerous observers. That extreme high tension is brought within the range of safety, and maintained there with occasional administrations of this method, has been practically demonstrated, and that, without otherwise unfavorably affecting the individual.

It would seem, therefore, that the recognition of these facts, and the general employment of the sphygmomanometer, in connection with the indicated employment of electrical currents, and the light bath in regulating the extremes, offers means of controlling otherwise perilous conditions, and if judiciously employed in the early stages, of preventing the subsequent cardiac hypertrophy. Systematic investigation will eventually lead to a solution of the etiological factor in these cases. It must be borne in mind by those who employ means for lowering arterial tension, that in the advanced stages of

arterio-sclerosis, with marked cardiac hypertrophy, it would be extremely dangerous to lower the tension to a degree which will, by lessening the work of the cardiac muscle, permit it to atrophy, which would end in a condition of dilatation without hypertrophy. In such cases, to lower the tension to a reading of 10 to 20 millimeters less, will serve to remove the impending danger of apoplexy without seriously affecting the muscular structures of the heart.

That arterial tension can be controlled, and that arterio-sclerosis, when conditions of tension come early under observation, can be anticipated and prevented, seems about to be a realized fact. This, together with the regulation of the habits of life, will concern the profession and the public as the solution of one of the most serious problems in therapeutics.

Progress in Physical Therapeutics.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

"The X-Ray, Ultra-Violet Ray, and High Frequency Currents in Diagnosis and Therapy." N. Y. M. Jour., June 15, 1907, by Sinclair Tousey, M. D.

This very valuable paper is worthy of much quotation. The doctor deals in a very scientific way with the physics of the x-ray and high frequency currents. He deals largely in studying the penetration of various subjects by the ray. He calls attention specifically to the different powers of penetration of different rays. He divides the rays into soft, medium, and deeply-penetrating rays and uses, in many cases of treatment and examinations, the sole leather shield for elimination of the soft ray. He describes fully the Holzkecht's chromoradiometer, and also the apparatus of Sabouraud's and Nyre for the measurement of the intensity of the rays, but as all of these are rather impractical for the general worker, he demonstrates a method of measuring the rays of his own devising, and, in the opinion of the author, it is worth repeating in its entirety, as he thinks it is very practical and useful. "This consists in finding out to what distance the x-ray will carry, with sufficient strength to produce visible light in the fluoroscope. The measurement is made before the x-ray treatment or examination is begun. The observer holds the ordinary fluoroscope to his eyes while he backs away from the x-ray tube, and the

nurse turns the x-ray on and off. In this way he finds the greatest distance at which the fluoroscope may be held and still show visible fluorescence, while the x-ray is turned on, and darkness when the x-ray is turned off. This distance expressed in yards gives the intensimetric numbers. If it is five yards, the intensity is said to be five Tousey. This is a suitable strength for most treatments. Three applications a week, at a distance of nine inches from the patient to the anticathode, or central disc of the tube, each application lasting from three to five minutes, have been made by the author in the successful treatment of inoperable recurrent carcinoma, psoriasis, etc. An intensity of twelve to fifteen Tousey is required for an x-ray examination, and with these the exposures is usually a minute or less."

THERMOTHERAPY.

EDITED BY DAVID E. HOAG, M. D.

Thermotherapy. By J. A. Bennett, M. D. California Medical Journal, July, 1907.

This article bears out the axiom that "oft repeated truths are convincing."

The doctor speaks of the great extremes to which surgery and drugging have been carried; not only for the sake of self-gratification, but for reputation and fee. Many physicians are now, however, beginning to realize that there are many things besides the drug and the knife, that can be used as therapeutic agents, while the "dear public," on the other hand, are ready to consider any therapeutic agent that is not medicine or the knife. The doctor then goes on to state that the hot air apparatus, especially the one manufactured by Betz, is not only extremely simple in management, but very efficacious, and that systemic effect is often obtained from instruments made for local use.

Dr. Bennett then goes on to enumerate the large class of cases in which hot air is beneficial, giving good authority for the statement that there are few contraindications for the general or body application of dry hot air, and no contraindications for the local use. He recommends the careful examinations of every patient's heart, arteries, and kidneys before advising hot air treatment.

Caution should be observed if the person is suffering from fatty or fibroid degeneration of the heart. In cases of valvular insufficiency it is recommended that in the beginning short applications at comparatively low temperature be increased gradually. The doctor believes that this treatment is entirely contraindicated in arterio-sclerosis.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Hydrotherapeutic Prescriptions. By Joseph H. Pratt. Boston Medical and Surgical Journal.

J. H. Pratt quotes Cohen as suggesting that there should be in every city an institution to which any physician might refer his patients with a definite hydiatic prescription, just as he can now send them to the apothecary. Precision of method is essential to success. In view of the institution already established in Boston he outlines the proper treatment in chlorosis and other forms of anemia, chronic muscular rheumatism, chronic arthritis, neuralgia, disease of the spinal cord, exophthalmic goiter, chronic pleurisy, cardiac insufficiency, gastric and intestinal disease, hypertrophy of the prostate, neurasthenia, hysteria, chorea, chronic nephritis, obesity, and diabetes, annexing thirty-five definite prescriptions applicable to one or more of the conditions described.

Physiologic and Clinical Aspects of Hydrotherapy, with Its Special Reference to the Treatment of Psychoses. By R. D. Baker. Jour. A. M. A., 1904.

The various methods of hydrotherapy are noted by Baker, who gives the results of their employment in certain cases of mental disorder in the Morris Plains asylum. He has found the wet pack at 65 F., or the full bath at 95 to 105 F., very useful in excited cases and in insomnia, and at present has a case under treatment with mild excitement and confusion in which the wet pack seems almost to restore the normal condition. The improvement seems to be progressive. He has employed hydrotherapy in twenty-six cases of melancholia; with or without agitation, dementia precox, hysteria, puerperal insanity, characterized by depression and slowness of thought, painful delusion, etc., lack of nervous and muscle tone, sluggish circulation, anorexia, loss of weight, greasy acne-covered skin, intestinal fermentation and constipation. In these cases he has used ablutions and wet packs with advantage, continuing for various periods according to the case, with decidedly good results, improvement in the physical condition, quieting of the agitation, gradual disappearance of delusions and of the prior mental state together with physical improvement. He thinks the methods valuable adjuncts to hygienic and medicinal measures.

Saline Infusions in the Treatment of Mental Diseases.

W. S. Greidenberg (Archiv für Experimentelle Path. in Phar.) has employed subcutaneous saline infusions in mental diseases and recommends the method very warmly. He has seen excellent results from its use. The infusions have a sedative effect, promote sleep and appetite, are well borne, and under elementary aseptic precautions there is no danger to be feared. They are indicated chiefly in all psychoses of an infectious, toxic or autotoxic nature. Psychomotor excitement, insomnia, and anorexia call directly for saline infusions. The technic is simple and needs no description here. The ordinary physiologic saline solution (7 per cent.) has been used, beginning with 250 cc. and going up to 1,500 cc. at a single injection. There are no serious contraindications to the use of saline infusions, though some additional caution is appropriate in the presence of cardiac disease, chronic pulmonary affections, intracranial hyperemia, and generally in conditions rendering an increase of vascular tension undesirable.—Am. Med.

Cutaneous Perspiration. Deutsches Archiv f. klinische Medizin, Berlin.

Schwenkenbecker thinks that water evaporates through the skin outside of the secretion of the sweat glands. This cutaneous perspiration is a regulating process, but the amount averages as much as twenty-eight gm. an hour for a young man of ordinary size on a moderate diet and at moderate work. He conducted experiments on a large number of subjects, the results of which are tabulated, and the technic described. He comments on the paucity of our present knowledge in regard to the water metabolism, which was his inspiration for the present monograph.—Jour. A. M. A., 1904.

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Principles of Opsonotherapy.—In Wright's article in the Jour. A. M. A., for August 17, 1907, there is one section of especial interest to the general practitioner, and which is discussed under the heading of "Conditions Which Obtain in the Foci of Bacterial Infection."

All bacterial foci, he states, are centers of lowered bacterial resistance, foci in which there is a deficiency of anti-bacterial substances. Bacteriotrophic substances are absorbed by bacteria when the blood fluids come in contact with bacteria. In case of

foci cut off from the blood stream, the conveyance of bacteriotrophic substances to the focus of infection by the lymph stream can rarely keep pace with the absorption.

In treating such bacterial foci, certain general principles have to underlie our therapeutic measures:

1. We must provide for the conveyance of bacteriotrophic substances into the focus of infection.

2. In case the accumulation of stagnant fluids in the focus of infection effectually prevents the entrance of bacteriotrophic substances, as a preliminary measure we must draw off that fluid which occupies the focus.

3. In case there are other obstacles to the free streaming of the lymph through the focus of infection, we must remove those obstacles.

In a case of simple infection, when the tissues are uninjured and the lymphatics are open, the conveyance of the bacteriotrophic substances in the lymph can best be accomplished by causing, through the agency of heat or other rubefacient, an increased blood supply to that region. It can also be accomplished as in Bier's method.

In various forms of infection, special conditions arise:

1. When bacteria are growing in or in contact with a serous effusion, for example, in the peritoneal cavity in a case of tuberculous peritonitis, the fluid has a lower opsonic index than the blood. The bacteria are cultivating themselves under a lower bacteriotrophic pressure. In such a case the indications are not so much to increase the general resistance of the patient, which may be high, but to remove the stagnant fluid and to allow access of a fluid of high efficacy from the lymph stream.

2. In abscesses and discharging sinuses not only is there an absorption of bacteriotrophic substances by bacteria, but also is there a liberation of a tryptic ferment by the leucocytes. Therefore, in attempting to destroy the bacteria in an old suppurating focus by the agency of opsonins and leucocytes, and to guard the tissues against the digestive action of the pus, provision must be made for the replacement of the tryptic and non-opsonic pus fluid by the antitryptic and opsonic fluid freshly derived from the circulating blood; and this may be affected by the means previously mentioned.

3. In the case of a dry sinus and of brawny swelling, special conditions also occur. In the former the inflow of lymph is prevented either by an excess of granulations or by a deposit of fibrin on the sinus walls; in the latter case by a clotting of the fluids in the lymphatics. In such conditions it is evident that more is needed than an increase in the bactericidal power of the blood and circulating lymph.

As an illustration of the latter condition, a case of Ludwig's angina is cited which is of sufficient interest to quote in full:

"History.—The patient, a middle-aged man, had in the first instance developed what was taken for an indolent furuncle in the parotid region. When after considerable delay this was incised no trace of pus was met and the tissues were found to be everywhere dry and infiltrated. They remained in this condition and the wound showed absolutely no disposition to heal. Two weeks later, the patient, who till then had been taking outdoor exercise, was suddenly taken seriously ill, and the brawny swelling, which up to that time had been limited to a patch on the left cheek, spread rapidly round under the jaw from one ear to another.

"Surgical Treatment.—A surgeon now carried a series of vertical incisions deep down into the indurated tissues. Twenty-four hours afterward the patient had lapsed into a condition of low delirium and the local conditions showed no signs of improvement. When I saw him I could not, even at the bottom of the gaping incisions, find sufficient moisture to fill the loop of a platinum needle. Film preparations obtained by pressing cover glasses against the sides of the wound showed abundant streptococci and only here and there a leucocyte. Blood drawn from a vein at the elbow with the intention of making a culture, clotted *instantaneously* in the syringe.

"Other Treatment.—It was immediately clear that what was most urgently required in this case was not that further means of antibacterial defense should be furnished to the patient, but that such means of antibacterial defense as were already at his disposal should be brought into application on the streptococci in the focus of infection. With a blood so viscid and coagulable as was that of this patient it was inconceivable that any lymph should transude into his tissue. It was inconceivable also that any transuded lymph should not clot in his lymphatics. Influenced by these considerations large doses of citric acid were prescribed, 60 grain doses being administered every three hours. Six hours after the first dose had been taken, lymph began to ooze into the wounds, and by next morning all the wounds had begun to bleed. The administration of citric acid was then suspended. A culture of infecting microbes having now been obtained, the opsonic index of the patient's blood was determined. That opsonic index working out at 1.8, and very distinct amelioration having taken place in the patient's symptoms, inoculation treatment was postponed. There was not afterward any occasion for immunizing intervention, the patient making continuous and rapid progress to complete recovery."

The remainder of the article concerns itself chiefly with inoculations: auto-inoculations, both spontaneous and artificial; the assistance which can be obtained from artificial auto-inoculations in the diagnosis of obscure cases of localized infections; a discussion of the comparative merits of treatment by induced

auto-inoculations and treatment by the inoculation of bacterial vaccines; a consideration of the question as to whether inoculations of bacterial vaccines may be undertaken in those types of bacterial infections associated with spontaneous auto-inoculations; and a brief summary of the results which have been obtained by vaccine therapy.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

Treatment of Eczema.

Dr. Henry Waldo, in the British Medical Journal, says "It is now admitted that eczema is not caused by a parasitic organism. It, therefore, follows that anti-germinal remedies are not indicated, and even make a pure and simple eczema much worse by irritating it." Care must be taken to exclude seborrheic dermatitis, which is benefited only by certain antiseptic remedies.

The author goes on to say that various food toxins and the products of imperfect metabolism and malassimilation by circulating in the blood, can produce erythemata as well as other conditions of the skin, and if they cannot often produce an eczema, they may aggravate it and possibly produce it in a predisposed subject. To counteract this tendency, diet the patient and prescribe correctives and give plenty of water between meals. All that is required locally are quieting and protecting applications.

If for any reason chloride of sodium is retained beyond the normal quantity, the excess entails the retention of an additional quantity of water to hold it in solution. The surplus salt and water under certain circulatory conditions passes out of the blood into the tissues, and in this way eczema may be kept up, so that it may be necessary to lessen or cut off the common salt the patient is accustomed to take with food.

Treatment of Acne and Chronic Eczema. By Russell H. Boggs, M. D. Journal A. M. A.

The writer of the paper strikes the keynote when he says: "The treatment of skin lesion demands of the practitioner a sound knowledge of general medicine and the experience of the various therapeutic agents employed."

As Sabouraud states: "There is not a single treatment for eczema, but a thousand, which proves that there is not a single good one." The treatment of eczema—possibly as much as any other disease,—shows the fallacy of treating the name

rather than the condition. We commend the author when he says: "The successful treatment of acne and eczema means something more than a hasty prescription for a tonic and an external application. Routine treatment without a careful study of the etiology, pathology, stage, and type of the disease, shows lack of clinical knowledge." He says very little about the older routine remedies, but goes on to show the indications and contra-indications of the Roentgen ray. He thinks a large per cent. of these cases have not been treated intelligently—that the physician should be familiar with the rays, as well as with dermatology.

In eczema internal treatment is important in a certain number of cases, but as a large majority of patients suffering from eczema are in perfect health, and the disease is due to some local cause, local treatment only is necessary. The author would use the rays only in the chronic form, as the acute and subacute forms can be controlled by other remedies.

The effects of the rays are most marked in squamous eczema, since it is more chronic and less liable to yield to other remedies. It requires more intense radiation to relieve the pruritus in papular eczema and there is a greater tendency to recurrence than in any other form of the disease. Generally, after a few applications of the rays the discharge and itching cease. The rationale of the Roentgen treatment lies in its stimulation of metabolic processes, especially in chronic inflammation. The location and type of the disease should always be carefully considered. In deciding the dose, the character of the lesion, its chronicity, and the vitality of the patient must all be considered. In the author's opinion great care should be used in treating chronic squamous eczema, as the nutrition of the skin is poor and the vitality is low. A mild dosage should be used or else a severe dermatitis is liable to result. Rays of a low penetration should be used. A low tube is not only more efficient, but prevents unnecessary exposure of the underlying tissues. The doctor's rule is to place the anode ten inches from the surface, with one and a half milliamperes of current passing, providing the patient is in good physical condition.

A safe rule to follow is to start with ten minutes' exposure, three times a week, until from eight to ten treatments are given.

SOCIETY MEETINGS.

TRANSACTIONS OF THE SEVENTEENTH ANNUAL
SESSION OF THE AMERICAN ELECTRO-THERA-
PEUTIC ASSOCIATION, HELD SEPTEMBER 17,
18, AND 19, 1907, IN COPLEY HALL, BOSTON, MASS.

FIRST DAY, SEPTEMBER 17, 1907.

Morning Session Continued.

REPORTS OF STANDING COMMITTEES.

The Committee on Induction Coils and Alternators; no report.

The Committee on Electrodes; no report.

Committee on Meters; no report.

In the absence of Dr. Heuel, Dr. Dickson submitted a report as his contribution to the report of Committee on Cataphoresis:

On motion of Dr. Snow the report was accepted and placed on file.

Report of Committee on Static Machines and Condensers.

MR. PRESIDENT AND GENTLEMEN:—

Your committee on static machines and condensers have endeavored to thoroughly canvass the field laid out for them. They find that there is really nothing new to present in the underlying principle or the construction of static machines. The principles of static electricity were recorded about twenty-five centuries ago when Thales, the Greek philosopher, in attempting to impart a polish to amber discovered that amber, then called electron, became possessed of a hitherto unknown property. This property was electricity induced by friction upon a dielectric.

Not until the year of 1663 do we hear anything further of this newly discovered property of matter, when Otto Gurrick, the mayor of the city of Magdeburg, made use of this principle by constructing a ball of sulphur, which having friction imparted to it gave out static sparks.

In the year of 1700 Hauksbee used again the same principle, but substituted glass for the sulphur. From that time to the present no better dielectric has been discovered. Glass permitting of easy molding, the question soon arose as how to present the greatest possible surface in the most compact space, so that to-day the main features of static machines are proper mechanical construction, insulation, and the material used.

It is *not*, in other words, a question of principle, but one of efficiency and durability.

Your committee is of the opinion that the present Holtz machine, using glass plates with a separate charger, inclosed in an air-tight case, properly insulated and mechanically constructed of selected material, is the best and most efficient instrument that has been devised.

This committee would recommend to the manufacturers for consideration, ways and means for quickly drying the inside of such an instrument, if possible doing away with the necessity of opening the ends of the cases as at present.

On motion of Dr. Bishop, of Harrisburg, this report was accepted and placed on file.

Dr. Morse of Committee on Constant Current Generators and Controllers stated his report would be submitted later.

Report of Committee on Radiant Energy.

FELLOWS OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION:—

I regret very much to report that your Committee on Radiant Energy was deprived of the co-operation of so able a man as Dr. Clarence E. Skinner, who informed your chairman that other engagements made it impossible for him to serve on that committee.

Dr. Pitcher contributed the results of his personal clinical experience with electric light, which is included in this report.

Your chairman corresponded with a number of workers in the field of radiant energy, physicians as well as manufacturers, requesting them to furnish us with recent information, and excerpts from answers deemed important are here given.

For convenience this report will be divided into three parts: viz., (1) The Roentgen Rays. (2) Radium. (3) Electric Light.

(1) *The Roentgen Rays.*—Professor Von Jaksch reported to the Scientific Society of the German Physicians, in Bohemia, the results of experiments he had made to determine the comparative permeability of the X-ray through silver, gold, and platinum. His aim was to employ a radiotherapeutic method which would act deeply on the internal organs without injuring the surface. He demonstrated that a shield of silver 1.5 of a millimeter in thickness was capable of entirely intercepting the rays that were injurious to the skin, without interfering with the penetration of those which should act on the viscera. He cited a case of leukemia where the rays were directed to the region of the spleen through his silver shield, the patient receiving during three weeks 25 exposures of 25 minutes each. The enormously enlarged spleen diminished rapidly, the leucocytes were reduced from 250,000 to 8,200, while at the ex-

ternal site of application there was only a little redness with signs of pigmentation and desquamation which disappeared in a few days. He also stated that he treated several cases of visceral carcinoma, giving thirty minutes' exposure without causing dermatitis.

E. Machlett & Son informed us that they manufacture a new X-ray tube known as the "Cornell." This tube is made of lead glass, with flint-glass window from which the rays emanate. The flint-glass window is applied directly to the part to be treated.

The regulator of this tube is permanently fixed so that the vacuum in the tube cannot get beyond 1 1-2 inches of vacuum. Dr. Geyser advises that a tube of this kind should be used by placing the tube directly upon the diseased parts without an air space intervening, and in that way it is impossible to cause X-ray dermatitis. They have also made an improved X-ray tube with a flint-glass window to which can be attached lead-glass shields of various diameters. They have also improved the regulating device by placing the chemical substance in a small inner tube fused onto a large tube which is sealed to the seal of the tube. This improvement in the regulator keeps the tube from puncturing.

The Villiers Ventril Tube, No. 2, is a new form of tube so constructed when properly connected as to cut out all the inverse current, and is the only valve tube which has an attached self-regulator.

Dr. R. V. Wagner informed the committee that he had designed a shutter attachment to his compression diaphragm for the purpose of regulating the length of exposure for both radiographic and therapeutic work. For radiographs the shutter is operated by a bulb or tube in much the same way as on ordinary cameras. To meet therapeutic requirements, the shutter is automatically closed by a little clock set to give the required length of exposure. The shutter may also be arranged so as to be electrically operated by the current passing through a small tube of silver emulsion in series with the mechanism for operating the shutter, so that after a given chemical change has taken place in the action of the rays on the silver emulsion, which varies with the distance from the tube, the shutter is automatically closed.

(2) *Radium*.—Work in the field of radium therapy is progressing. It is often used with success after the X-rays and the Finsen light have failed.

It is for sale chiefly in the form of a bromide, but it is also made in the form of sulphate, chloride, and carbonate, alone or combined with barium. The preparations vary in radioactivity from 40 to 1,600,000 or more, and are put up in glass and aluminum containers. It is with these tubes that it is generally employed in therapeutics by the majority of oper-

ators. It may also be applied naked or on gauze, fine sponge, or in glycerine or water.

Recent literature on radium contains many reports of experiments which prove that it is destructive or inhibitive to germ life. The most of the experiments were made on the bacilli of typhoid fever, diphtheria, tubercle, cholera, bacillus prodigiosus, and the virus of rabies.

Dr. Robin reported to the French Academy of Medicine on the action of radium in chronic rheumatism. The method of application was to expose the part affected to a metallic screen or shield covered with radium in the form of powder. He stated that the radium caused resolution of the swelling, disappearance of pain, loosening of contracture, and return of function.

Dr. A. Laqueur reports in the Berliner Klinische Wochenschrift on the use of artificial radium baths. The radio-activity is proven by the improvement in the diseased joints and by the presence of radium emanation in the urine of the patient while under treatment.

In the Official Bulletin of the French Electrotherapeutic Society, Dr. Oudin reports cases of uterine fibromyoma accompanied by hemorrhage; also cases of uterine and urethral gonorrhea which were treated by radium successfully. The treatment was conducted by using a glass tube, 25 millimeters long and 2mm. thick, inclosed in aluminum and containing 25 mg. of pure radium bromide, 150,000 radio-activity, with exposures of 10 to 15 minutes.

In the August Journal of Advanced Therapeutics is to be found an abstract of a very interesting lecture by Dr. Geo. H. Graham, entitled, "Radium and Its Medical Uses," to which I take the liberty of calling your attention.

(3) *Light Therapy*.—Dr. Edward C. Titus reports "that he is still continuing to use the 5,000 candle-power marine searchlight to counteract the sterility induced by the prolonged exposures of the X-rays and that" the results have fully verified his observations set forth in the paper read before this Association in 1905. He also reports an aggravated case of myocarditis of rheumatic origin which was greatly benefited by the parallel rays of the marine light given daily for twenty minutes, and a very interesting case of progressive muscular atrophy which has been improved by the application of the same rays to the spine.

Dr. Margaret A. Cleaves informs us that the Boyden Prize of the Franklin Institute, of Philadelphia, which was offered to any resident of North America "who should determine by experiment whether all rays of light and other physical rays are not transmitted with the same velocity," was awarded to Dr. Paul Heyl. He proved by experiment that the ultra-violet

rays, for which glass is not transparent, have the same velocity as light rays proper.

In the *Technical World* for April, 1907, is to be found a description of a new silicon filament invented by Professor H. C. Parker and Walter G. Clark, of Columbia University. The light is exactly that of diffused sunlight, radiating all the solar colors, and is white where the ordinary incandescent is yellow. Twenty-five per cent of the energy used is converted into light, while in ordinary incandescent only 5 per cent. is light, and it will show a white light under a current that leaves the carbon filament unaffected. These filaments can be inclosed in a glass bulb or imbedded in quartz, although it glows without any inclosure.

The Helios Therapeutic Lamp, a new arc lamp made by the Betz Co., is of 5,000 candle-power and uses 15 to 20 amperes, direct or alternating. It is constructed similar to the marine searchlight.

The Leucodescent Lamp has been improved by having a circular frame attached to the mouth of the hood for carrying glass screens of different colors. The colors now provided are ruby, yellow, amber, and violet. The same manufacturers are also providing at present a cabinet and a table, designed for administering a radiant bath with a leucodescent lamp or lamps.

The Uviol Lamp is constructed similarly to the Cooper Hewitt light, except the tube which is said to be a barium phosphate chrome composition. This glass is pervious to the ultra-violet frequencies. Therefore, the name *uvio*l, which is the abbreviation of the words ultra-violet.

The Solar Lamp has been improved in its construction so that it may be given with greater facility in the vertical as well as in the horizontal position. The screens in different colors are attached directly to the reflector.

The diseases in which photo-therapy is more or less effective are: Acne vulgaris, acne rosacea, alopecia areata, anemia, appendicitis, Bright's disease, bronchitis, bronchial asthma, carbuncles, constipation, eczema, furuncle, gastritis, herpes zoster, laryngitis, lupus vulgaris, lupus erythematosus, malnutrition, neuritis (cervical, brachial, or sciatic), nevus (of the flat vascular variety), otitis media, prostatitis (acute and sub-acute), psoriasis, rheumatism, scabies, scrofula, sycosis, syphilis, tinea, tubercular lesions, ulcers (varicose, indolent, or phagedenic), and wounds.

This alphabetical list could be so enlarged as to make light appear almost a panacea, because the extent of diseased conditions in which light is potent as cure, relief, or adjunct, is very broad, judging from reports of so many able workers in phototherapy.

FINKELPEARL, Chairman.

The report was followed by an exhibition by Dr. Finkelpearl, showing vegetables grown under different colored glass.

Dr. Brinkmann of Committee on Current Classification and Nomenclature stated that he would submit a report later.

The President appointed Drs. Bishop, of Harrisburg, and Titus as Committee on Audit.

• Dr. Dickson: I beg to state that the Association should express deep grief at the untimely death of two of our very worthy members of this Association, one of whom was former President of the Association, Dr. Herdman, and beg that a committee be appointed to extend the sympathy of the members of the Association to the family, and that we express our deep grief at the untimely death of these two men by rising and remaining standing for the usual time. The Association stood in silence for five minutes.

Dr. Brinkmann: The Executive Council has sent resolutions to the family of Dr. Herdman, and the death of Dr. Wallian had been quite recent.

Dr. Snow: I wish to announce also the death of Dr. Lucy Hall Brown, although not a member at the time of her death,—a distinguished woman and of international fame, and who, in her membership with us, was an honor to the Association.

Dr. Brinkmann: With reference to the reports of the Committee on Current Classification and Nomenclature, I will state that the Executive Council are considering the advisability of publishing the reports for previous years in a bound volume.

Dr. Dickson offered the following amendment to the constitution: "When the phraseology of the constitution and by-laws is obscuring or where one paragraph conflicts with another, the exact wording of such amendment or amendments shall be left to a committee of three to be appointed by the President, to report at next annual meeting of the Association for immediate action thereon."

Dr. Brinkmann stated that it would be advisable to appoint a committee to revise such portions of the constitution so that they will be clear.

On motion the morning session adjourned.

REPORT OF THE ELECTRO-THERAPEUTIC SECTION OF THE BRITISH MEDICAL ASSOCIATION.

The seventy-first annual meeting of the British Medical Association, which was held at Exeter during the last week of July, was of special interest to radiographers and electro-therapists, because the claims of electro-therapy were recognized by the creation of a special section. This was largely due to the influence of the Association's president, Dr. Henry Davy. The workers in this branch of medical science were

successful in making the meeting worthy the occasion, insuring a permanent place for electro-therapeutics in future gatherings. There were so many papers that it was impossible to devote to the discussion of them the time which they deserved. During the days of the meeting about twenty papers were read. The presence of continental workers, Dr. Stephane Leduc, of Nantes, and Professor Wertheim Salomonson, of Amsterdam, found expression in a complimentary resolution at the close of the session. There was also marked interest manifested by local practitioners, who supported the session in considerable numbers.

The President's Address: Electric-ionic Medication.—Professor Leduc, after paying a tribute to the British genius in the realm of electrical science, considered the subject of the title of his paper. He stated that in recent years much had been learned about the action of currents upon living beings. The faculty of introducing electrolytic bodies into the organism through the skin, had increased in a large measure the resources of the therapist and the power of medicine. The main obstacle to the electro-ionic medication is the burning of the skin, produced by the more or less caustic ions which had their birth at the surface of the metallic electrodes. These ions had a speed much greater than that which was commonly attributed to them, because they were driven, not only by the electromotive force, but also by a high osmotic pressure. The ions which had their origin at the surface of the plates raised and maintained a high osmotic pressure, and were thus rapidly diffused away towards the skin.

He then devoted himself to the question of preventing the caustic ions from reaching the skin, which he accomplishes by replacing the layer of chamois leather, which ordinary washing would not cleanse from the caustic ions, by 15 or 20 layers of absorbent tissue well soaked in electrolytic solution. Under these conditions the caustic ions would not have time to penetrate the fabric during a single sitting, and would be replaced by a fresh one or thoroughly washed to remove the last trace of metallic and other caustic ions. He found that the caustic action of the ions depended not only on their nature, but on their number or surface density. If the electrodes were applied loosely, the current passed at only a few points. At these points the surface density became so great that the skin was damaged or destroyed. This was prevented by the perfect adaptation of the electrodes to the surface of the skin. He laid stress upon the use of pure distilled water in the preparation of the electrolytic solution, so as to avoid the introduction of foreign and undesirable ions.

He closed his paper with the description of results obtainable when due care was exercised so as to eliminate this caustic action on the skin. The high current intensities necessary both

for superficial and for deep action could then be employed with safety. By this means thoracic diseases came within the reach of medical electricity. The introduction of iodine ions over the whole surface of one side of the thorax gave most excellent results in chronic pleurisy, even if the subject was deformed. He says that with a 60 to 100 milliampere current, and a solution of potassium iodide as the cathode, iodine appeared in the saliva in from 10 to 15 minutes. If, however, the iodine solution was used at the anode, no iodine appeared in the saliva, even with a strong current passed for a considerable time.

X-ray and Sensitive Plates.—Mr. Mackenzie Davidson opened a discussion on the subject of X-rays and sensitive plates. He dealt first with the main essential qualities that an X-ray tube ought to possess. First it is important to ascertain the position and sharpness of the focus of the Roentgen tube. His method consists in placing in front of the X-ray tube a thick sheet of lead in which is a small pin-hole aperture. The distance of the pin-hole from the anode is measured, and a photographic plate is placed at an equal distance on the other side of the lead. In this way an image is obtained, the actual size of the X-ray producing surface.

He also pointed out the deterioration of the image resulting from the X-rays given off by the glass bulb itself, which fogged the plate and blurred the shadow. He advised inclosing the tube in a box, lined with a thick layer of red or white lead, so as to cut off the X-rays proceeding from the surface of the focus-tube.

He detailed a series of experiments which he had undertaken with a view of determining the difference of the speed of photographic plates to ordinary light and to X-rays. He showed that if a plate were exposed to both X-rays and light for the same length of time, the result would vary according to which form of exposure had taken place first. A reversed X-ray negative could be produced by carrying out the exposure and development in daylight.

The question of the vacuum of X-ray tubes was discussed. Dr. Orton had lately discarded the use of high tubes for skiagraphy, with marked improvement in the result. He worked with a spark-gap of not more than 3 1-2 to 4 inches, even when photographing an abdomen of considerable thickness. In his opinion excellent results would be obtained with tubes even lower than this, if only one could get a focus-tube that would stand the necessary intensity of current. He considers it of importance that a high current should be used with a low tube.

Dr. Morton referred with admiration, not unmixed with envy, to the excellence of the American radiography, obtained by the use of low tubes of intense current. He had failed

to obtain these results himself because of the inferior tubes employed. He was impressed with the value of the low tube.

Dr. Howlett thought that it was not possible to overexpose an X-ray plate. The exposure could be prolonged indefinitely and development would still give a good result. He suggested that it might be possible to incorporate in the emulsion of the plate some non-actinic material, and thus obtain an X-ray plate which could be handled in daylight, doing away with the dark-room.

Professor Salomonson made an interesting speech on the theoretical side of the question. He pointed out that the electrons impinging upon the cathode did not lose their velocity all at once, but in a series of successive—possibly four or five—oscillations. The impulse was thus entirely stopped only after four or five waves, giving rise to what might be called secondary Roentgen rays from the anti-cathode. These rays were not so penetrative as the primary rays. Moreover, when the electrons started from the anticathode its potential was lowered, and thus during the time of a single discharge not one electron was emitted, but possibly twenty or thirty. These were emitted with different velocities, thus producing different degrees of impact on the anticathode, and hence X-rays of different penetration.

The Dosage of X-rays.—Dr. J. H. Sequeira's paper on the subject of X-ray dosage also led to a full discussion, in which many well-known radio-therapeutists took part. He gave the results of his experience of many years at the London Hospital. In dealing with the question of reaction following upon X-ray treatment, he pointed out how important it was to observe the period of latency intervening between the application of the rays and the appearance of the reaction. In considering the various instruments of precision which are now in the hands of X-ray workers, he said that he preferred that the current of the interrupter should be entirely independent of the current of the coil. On his switchboard there are two adjustable resistances—one for the motor of the interrupter and the other for the coil. With large coils, having an interruption of 16 inches, he preferred an interruption of about 800 per minute. With regard to the most important question, that of dosage, he said that in his clinic he worked along the following lines: The area to be irradiated is marked with a blue skin-pencil. The dose to be given is prescribed in terms of the Sabouraud pastille, and the patient is irradiated until the requisite change in tint is produced. He did not think there was any great advantage in giving the dose in a very short time, although he had obtained the B tint under certain conditions of the tube in as little as five minutes. In the treatment of rodent ulcer he gives an exposure equivalent to the B dose, and makes no further application of the rays until

the period of reaction is passed. This period may extend from three to six weeks and is never less than a fortnight. In a case of rodent ulcer where there was infiltration he has used a double dose. In treating the ulcerated forms of lupus vulgaris, he finds it wiser to begin with a small dose, not exceeding the B tint of Sabouraud's pastille. In the treatment of malignant tumors of the skin and in sarcoma he gives massive dosage at long intervals.

A New Meter for Estimating the Dose of X-rays.—Dr. H. Pirie read a paper on the estimation of the dose of X-rays by means of a specially designed voltmeter.

"I took a 1 c.c. pipette, about 1 foot long, divided into 100 divisions. I melted one end in a Bunsen burner, and blew a bulb on it about the size of a pigeon's egg. Through the glass of the tube I sealed two platinum wires, so that their free ends projected inside the bulb, but did not meet. I then filled the bulb with water, and left a small drop of water in the lumen of the capillary tube opposite the markings of the pipette. The current flows through the water from one terminal to the other, and liberates oxygen and hydrogen.

"The ordinary milliampere meter is under the disadvantage that its reading constantly varies with the resistance of the X-ray tube and that of the interrupter, and the resistance of an X-ray tube is constantly changing. The voltmeter is an integrating instrument recording not the quantity of electricity flowing at any particular moment, but the total quantity that has flowed during the observed time. This, in Dr. Pirie's opinion, is under certain conditions a fairly accurate measure of the output of X-rays. He pointed out certain precautions to be taken in the use of the meter, such as the suppression of the reverse currents."

The Einthoven Galvanometer.—The use of the Einthoven galvanometer was demonstrated by Professor Salomonson, who instituted various modifications to Einthoven's model. The latter uses a single electro-magnet with perforated pole-pieces, while Salomonson on the other hand uses two electro-magnets in the form of a nearly closed ring. He considered the use of this instrument in the study of the current curves of the primary of an induction coil. He also exhibited a number of normal and pathological electro-cardiograms. Every muscular contraction causes a so-called action current with every beat. To detect these currents both hands, or one hand and one foot, are connected to the terminals of the galvanometer by means of unpolarizable electrodes of special construction. Generally a small current of rest has to be compensated, in order to bring the enlarged image of the quartz fiber into the middle of the field of vision. Oscillations of a spot of light synchronous with the heart beat are thus obtained.

Oscillograph Tracings of Medical Coil Currents.—Dr. Lewis

H. Jones, by tracings taken by means of Duddell's oscillograph, showed the discharges of the ordinary medical coil. He states that he finds that the presence of ions in the core, or of long windings in the primary and secondary coils, increase the duration of the current waves. The long waves are more painful to the patient.

Dr. Lewis Jones' slides showed in a striking manner that the current waves of the secondary winding of a medical coil vary enormously—from 0.01 to 0.0005 of a second. He also finds that the presence of a condenser in the primary circuit causes the secondary current to be the seat of an oscillatory discharge. He suggested that an improvement in the character of the discharge might be obtained by using a secondary coil capable of giving a minute spark in air, and by interposing a gap in the circuit. In his opinion this form of current might yet prove to be the most advantageous of all from the point of view of electro-diagnosis, as the discharge under such conditions caused little effect upon sensory nerves, whilst retaining its effect upon striped muscle.

High-Frequency Treatment for Diseases of the Kidneys.—After instancing the experiments of Bouchard and Charrin, Apostoli, Berlioz, and others, on the influence of these currents in the treatment of various diseases, Dr. Somerville considered the effects of high frequency in facilitating the elimination of urinary toxins. In most cases the amount of urine became more abundant, except in polyuria, when there was a noticeable diminution. In a case of psoriasis, the amount of urine excreted during twenty-four hours fell from 150 ounces to 50 ounces whilst under treatment; and in a case of exophthalmic goitre there was a similar diminution. Dr. Somerville furnished a good number of analyses to prove that high-frequency currents have a marked influence in improving the metabolism in the body, as well as inducing a better ratio of uric acid and urea. In an illustrated case ten days under treatment, there was an increase of 119 grains of urea in twenty-four hours, giving a total of 420 grains of urea, and 4.4 grains of uric acid with a ratio of the two constituents, almost reaching normal. The amount of urine also was increased from 26 to 40 ounces in twenty-four hours. Dr. Somerville stated farther that the supposed benefit of high-frequency currents was demonstrated not to be purely imaginary, as by chemical analysis he was in a position to demonstrate that irregular and even abnormal metabolism might in a great measure be corrected or restricted. With the proper and more proportionate excretion of the constituents in the urine, they were compelled to judge that fewer toxins were retained within the body, and, therefore, they might reasonably expect that patients undergoing high-frequency treatment would show signs of improved health and vitality.

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THE ACTION OF THE RADIANT-LIGHT BATH IN NERVOUS DISEASES.

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During a period of nearly ten years I have used the radiant-light bath every day, sometimes giving as many as 100 baths a week. While the special object sought was the sudorific effects, its tonic and medicinal influence exceeded all expectation.

The effort to make a study of its peculiar action as distinguished from other conditions proved to be difficult because of the character of the patients and the very complex disorders from which they suffered.

The purpose of this paper is to indicate some of the clinical conclusions which have been apparent from its action on these persons, together with some possible suggestions for farther and more exact studies.

The patients upon whom it has been used were all spirit and drug neurotics and psychopaths, suffering from sclerosis, fibrosis, local irritation, and sub-acute inflammatory states, with deranged metabolism and degenerative conditions.

In addition to this there were always present neurosis and profound psychosis with organic and functional derangements. The efforts to treat these conditions, by any special means is always open to error from faulty observation and conclusions.

Exact measurements of the disability and degeneration present, furnish a basis from which to judge the action and influence of remedial measures. The more accurate the studies of these conditions the clearer the evidence of the effects of remedies; thus measurements of the sensorial conditions, the heart's action, and the arterial tension give some idea of the present and the application of means and measures changing these conditions indicate their remedial value. The error is

always found in attributing special results to particular means of treatment.

In all these drug and drink neurotics the simple withdrawal of the poison is followed by changes which often are ascribed to remedial measures alone. Thus elimination by cathartics and abstinence from food is followed by symptoms which a careless observer might think due to some special remedy.

The action of the radiant-light bath is not only eliminative, but something more than that. It is a tonic and stimulant and apparently has some specific influence on the cell and tissue which is yet to be discovered. For my present purpose I will divide these actions. First into that of a powerful sudorific and eliminative. Second, some special influence on metabolism, nutrition, and the cutaneous circulation. Third, its psychical effects on the nervous system and the influence on the emotions and mind.

As a sudorific the radiant light has a very pronounced uniform action. It is far superior and more active than hot air in its profound influence on the organism. The light rays penetrate to the interior of the body, creating increased activity in both cell and tissue. The circulation on the surface is more intense and rapid and the amount of water thrown off from the skin exceeds that from hot air. An effort made to estimate the perspiration from both hot air and radiant light indicated that, in most cases, this sudorific action reaches its point of greatest intensity in from ten to fifteen minutes, but from hot air it requires from twenty to forty minutes.

There is evidently some shock to the cutaneous nerves in the rapid intense action of the capillaries that react beneficially on the nerve centers, particularly in persons who are suffering from degrees of palsy following the use of spirits and drugs. The rapidity of the sudorific stimulation varies largely in different persons at different times. In some instances six or seven minutes' exposure to the radiant light is followed by a free perspiration. In others double this time is required. In persons under the influence of spirits or drugs two conditions seem to be prominent—one of slow and progressive relaxation culminating in profuse perspiration in a few minutes; in others a temporary blanching of the skin and oppressive feeling of dry heat followed by a sudden relaxation and profound perspiration.

In many cases states of insomnia and continuous exhilaration for several hours follow the use of the bath, followed by a profound sleep with the most restful feeling afterwards. In other cases somnolence almost bordering on narcotism continues for a time, followed by the same restful feeling. It is found from long experience that this condition is the most satisfactory, and the efforts to produce sleep and somnolence by this means are usually successful.

Examination of the surface of the body is made before the bath. If the skin is found dry and the circulation sluggish, warm showers are given, with strong soap and brushing.

Where the person is unaccustomed to bathe and has cutaneous disturbances of sensation and a tendency to take on inflammatory action from any internal cause, it is quite necessary to prepare the skin by massage, showers, cold and hot douches, with dry rubbing to secure the best effect of the radiant light.

Persons under the influence of spirits and drugs, and persons suffering from high-tensioned arteries always do better when the bath is preceded by a warm shower and rubbing. In other instances after free perspiration of the bath, a shower with gentle massage, a special somnolent effect follows, and the patient who has been awake for a long time will fall into a most refreshing slumber.

In some instances where the action of light on the surface produces a form of cutaneous palsy, blanching the surface for a few minutes, and later followed by intense redness and profuse perspiration, a prolonged shower is valuable to equalize the circulation. When the stimulating effect is followed by exhilaration and wakefulness for some hours after, a warm shower will overcome this. Patients should always recline after a bath for an hour or more in a well-ventilated room.

The excellent effects of light thus administered in the ordinary skin diseases is a matter of daily observation. This is greatly increased by salines in small doses before the bath and by warm showers.

In drug-takers the effect of the radiant light is almost a specific in overcoming irritations, diminishing nervousness and removing internal states of congestion for the time being. In many instances a prolonged bath is followed by the best results; in others a gentle surface stimulation is all that is required.

It has been observed that the free use of baths greatly diminishes the impulse to take spirits and drugs. The desire for relief for which drugs and spirits are used is less prominent and intense and this has led some observers to believe that the Turkish and radiant-light baths were capable of effectually removing the morbid impulse for drugs or spirits.

A more careful study shows that the baths divert nervous energies and remove sources of irritation, and that they have some special action in restoring the disordered cell and tissue.

The radiant-light bath has a marked physiological effect evident from the improvement of the function of the brain and nervous system that is unknown. The second effect of the radiant-light bath on nutrition and cutaneous circulation has many unexplainable phenomena. Sometimes the appetite is immensely stimulated and in nearly all cases the disordered digestion is improved. In some cases a craving for fats and sugars or acid foods is followed by a strong repulsion to other classes of foods. In certain cases where the action of the light produces profound perspiration an unusual thirst follows, and not infrequently a general relaxation of the system is followed by great looseness of the bowels and intense renal activity. In persons who have profound nutrient disturbances experiments have been made by massaging the body before the bath with soap and then washing in a strong solution of salt and water, the latter not rubbed off. This was followed by a great improvement in digestion and nutrition.

There are many reasons for believing that the skin, saturated with salt water before the bath, becomes more sensitive to the action of light; probably the salt is absorbed and in this way becomes a tonic influence. It was difficult to explain the marked improvement in the neurotic dyspeptics from the radiant light and the special value due to the salt or its influence on the skin.

Another experiment seemed to indicate the greater potency of drugs, particularly phosphate of soda, and in other instances vegetable acids, which were given a short time before the baths. There seemed marked connection between the two.

The same thing was apparent in persons suffering from great irritability and excessive nervousness, who were always benefited by large doses of phosphate of soda and pills of lupu-

lin given a short time before the bath. In the insomnias following the withdrawal of narcotic drugs the bath is a very valuable remedy given two or three times a day, preceded by hot-water douches, soda compounds, and occasionally sulphate of magnesia.

The nerve relaxation and rest with a tendency to sleep is very marked and from comparison with the hot-air baths and the same drugs indicates great superiority of the radiant light.

In alcoholics of the epileptic form or character, the action of the bromides seems to be greatly intensified by the bath. In many instances it was noticed that small doses produced extreme physiological effects when followed by the baths, and the supposition was that the salt was more thoroughly assimilated and distributed to the nerve centers by the action of the light. It has been suggested that the radiant-light exercises not only have a peculiar cell-stimulating power, but an influence over the mineral constituents of the body, increasing their assimilation and circulation or diminishing their irritative action. With a view to determine this, alkaloids of quinine and opium have been given before the bath was taken, and while the results are very striking the data are insufficient to draw conclusions. In morphinism and alcoholism the poison symptoms are always reduced after the bath. In Bright's disease and general dropsical conditions the drainage of the water to the surface by the radiant-light bath is more profound and less exhaustive. In chronic enteritis very marked results have been noted. These are no doubt mechanical as well as physiological.

The third effect of radiant light on the brain and nervous system is a realm of still greater mystery and is noted by startling changes which await future study and demonstration. The mental sense of relief and satisfaction seen in the buoyancy of the mind and the senses of quiet and comfort is a very common condition.

When massage is given before or after the bath a pleasing sense of fatigue and desire for sleep follows. States of despondency seem to pass away and the patient acknowledged relief which before was not recognized.

One very marked effect is the diminution of the arterial tension from five to twenty degrees noted by the Rivo Rocci

Sphygmomanometer. This may last a long time and be permanent.

In most instances the tension is lowered by the effects of the bath and with this the heart's action is steady and the disturbances of the senses are all diminished. It is possible to measure these effects with instruments of precision and show the exact changes that are registered in the heart, arteries, and senses.

Comparing this with hot-air baths the effects are very much greater and more marked. It is very evident that this is not due to the drainage of the water from the blood but to some other condition not very clear. In the hot-water bath often the tension is very little influenced and other organic and functional disturbances are seldom changed. The radiant-light bath preceded or followed by a static breeze has a very pronounced effect on the tension of the arteries and the action of the heart. In some instances a marked narcotic action follows. In another restlessness followed for a short time, then profound sleep for a long time.

The static breeze following the bath seems to have a soothing effect, and the combination of the two in certain persons has an almost specific action. In the insomnia following the withdrawal of drugs the baths have a sedative effect not only in lowering some psychical influence which antagonizes whatever delusions or derangements may be present.

The intensity of morbid impulses and hallucinations of the senses are changed for a short time at least. In delirium tremens the bath is marked in its effects and should always be preceded by vigorous massage and showers and large quantities of mineral water taken internally. This is usually followed by distinct sane intervals.

The mind seems to recover its balance for a time and with it the power of control returns. I have used mechanical massage and vibration before and after the use of these baths with excellent results.

In multiple neuritis and many of the local palsies the same results follow. In two cases where malarious fever complicated the drug-taking, the bath had a very marked effect in cutting short the paroxysm.

The psychical effect of perspiration from light is a very pow-

erful factor in many ways unknown and should be classed as a distinct form of medication. A degree of confidence and buoyancy is created which may be termed exhilaration and yet is more than this. It is a sense of relief and rest, freedom from pain and other conditions which for the time have a powerful reaction on the higher brain centers.

Most all persons who take these baths receive some half-conscious impulse of approach to ideal health that is most helpful, and this should be to encourage both physical and psychological forces of the most powerful therapeutic value.

These are some of the daily experiences and suggestions which encourage farther study and more exact observation. So far the ordinary incandescent light has been used. Other forms of light are more powerful and no doubt more pronounced in their effects. In all this there have been no ill effects noted. Increasing experience shows that the best effects from the bath follow when given in surroundings and circumstances adapted to meet the special conditions of each case.

I conclude with the statement that the radiant-light bath is a remedial measure of the widest application and its possibilities as an agent in the restoration of diseased cell and tissue are far greater than any present knowledge would indicate. Its effects are undoubtedly physiological in draining off water from the system; chemical in its action on metabolism and the salts of the body; and physical on its sudden profound influence over nerve forces and energy. The possibility of using it in private practice is more and more assured every year and the methods of using it will become perfected with increase of the knowledge of its influence.



THE PRODUCTION OF STERILITY BY THE X-RAYS.

BY F. B. GRANGER, M. D.,

Physician in charge of the Electro-Therapeutical Department of the Boston Dispensary.

In March, 1905, the startling statement was made by Brown and Osgood (1) that x-ray workers were liable to be, nay even very probably were, sterile.

That this might occur, should have been forecasted by the experiments on guinea pigs by Albers Schoenberg (2), who found that sterility was produced by three hundred and seventy minutes' exposure to the x-ray and that by one hundred and ninety-five minutes incomplete azoospermia.

Naturally this stimulated further experimentation.

Titus (7) found that seed exposed to the x-ray would not germinate. But that those exposed both to the ray and the marine search light sprouted readily. He also showed that the same held true in hens' eggs, namely; That those simply exposed to the ray underwent no change whatever, while those exposed both to the ray and the arc light showed embryonic development in various stages.

Tousey (7) exposed to the rays a pregnant cat which at term gave birth to three dead kittens, though two and a half months later she had a litter of healthy kittens.

Geyser (7) gave a setting hen frequent x-ray exposures yet seven out of twelve eggs hatched.

Lengfellner (6) reported that experiments on guinea pigs showed that even short exposures of the rays to the abdomen is able to destroy the life of the fetus even shortly before term, and that alterations were found in the ovary suggesting sterility.

F. Villemin (8) treated four male guinea pigs to various degrees of x-ray. All retained their sexual power, but on being killed were found to have had the germinal epithelium destroyed, while the rest of the genital tract and structures were unaffected.

Later (9) he reports that the x-ray destroys the seminal epithelium but that the internal secretions are intact and that there is no atrophy of the penis or seminal vesicles.

Ancel and Bouin (11) state that the local action of the ray on the testicle causes a disappearance of the external and seminal secretion with a preservation of the internal interstitial secretion, while on the ovary they cause a disappearance of both the external and internal secretion. They conclude that the results of the x-rays on the testicles are the destruction of the procreative power with preservation of the genital activity, while on the ovary the results are sterility and the appearance of all the symptoms which follow complete ovariectomy.

Albers Schoenberg (2) found that the exposure of the ovaries of rabbits to the ray caused disappearance of the Graafian follicles and diminution of the size of the organ.

Dr. Villemin (12) concludes from his experiments on guinea pigs that the x-ray destroys the seminal epithelium but spares the interstitial gland.

Bergonié (10) exposed human spermatozoa on a warm slide to the x-ray, but with negative results.

Leaving the results of animal experimentation and the question of the pathological changes, let us see what has been reported in man. In January, 1905, Brown and Osgood (16) reported eighteen cases of either total azoospermia or oligonecrospermia in men who had done extensive x-ray work for three years or more. One half of these were married and not one had had a child since he had undertaken this work.

In the Baudelocque Clinic (5) frequent treatments, lasting from thirty to forty minutes at a time were given to patients in various stages of pregnancy and lactation, none of whom seemed injured. Twenty-two of them returned for delivery: ten in the following year, three after two years, four after three years, four after four years, and one after six years.

Van Allen (13) describes seven cases in four of which, the ones having had the longest exposures, there was absence of spermatozoa, while the other three showed no change.

Albers Schoenberg (2) relates that in one case treated for pruritus, two x-ray exposures of ten to fifteen minutes' duration, produced an azoospermia complete in twenty days, while five months later there was entire recovery. In all cases of attendants in the laboratory who had been employed for more than three years, azoospermia and in some cases oligonecrospermia was found.

Lapowski in January, 1905, reported before the Genito-Urinary Section of the New York Academy of Medicine, a case treated for pruritus ani, and oligonecrospermia and azoospermia with recovery in four months.

Laquerrière (15) reports a case of a physician who, having practised radiology since 1900, found in 1901 that he was sterile. He still continued to use the x-rays but added intermittently precautions such as shields, not beginning their use however until 1905, five years after he had first begun to use the rays. A little later after one month's vacation there were found in his semen "certain highly refractive corpuscles having the appearance of the heads of spermatozoa." Four months later spermatozoa reappeared, and one month after his wife became pregnant and a normal confinement ensued.

In still another case azoospermia persisted for two years after x-ray work had been discontinued.

His third case was a man who had been in constant attendance on x-ray séances for more than a year, and yet, in his seminal fluid there was a perfectly normal number of active spermatozoa.

I have three cases to report: two of my own and one of which I knew the circumstances.

Case I.—Miss B., age thirty-eight, school-teacher, came to me for treatment of an uterine fibroid the size of a large coconut. As she had had a number of hemorrhages and was extremely anæmic and was in no condition for an operation, and as I thought that possibly by producing an artificial menopause by the action of the x-rays on the ovaries and that thereby a spontaneous retrogression of the fibroid might ensue, I readily consented to try x-ray treatments.

For six months exposures were given three time a week over three out of the four quadrants into which I had divided the lower half of the abdomen, employing at a distance of fourteen inches a tube in which the bones of the hand assumed a grayish aspect and using in my primary a current of three amperes.

In all she had fifty-nine exposures of from twenty minutes to half an hour, making a total of twenty-four hours and thirty-five minutes x-ray exposures. The abdomen was well browned and only in one small area was there any appearance of dermatitis. The hemoglobin rose from thirty-five to eighty-five per cent., and the hemorrhages ceased, but the fibroid steadily increased in size. Finally she had another severe hemorrhage and twenty days later a complete hysterectomy was performed. The uterus and ovaries I had examined by Professor Whitney of Harvard University Medical School, and he reported that one ovary was destroyed by the pressure of the fibroid while the other seemed perfectly normal in every respect.

Case II.—Mr. X., clerk, thirty-four, was sent to me by his surgeon. Mr. X. because of insanity in his and his wife's family wished either an ovariectomy or castration performed, preferably the former. He was met by the counter proposition that the x-rays be tried upon himself. Examination of his

semen collected in a condom showed very numerous, actively motile spermatozoa with no misshapen forms seen, a mechanical stage being used on the microscope and a prolonged examination being made.

Treatments were begun May 4, 1905, and continued until August 26, 1905. Thirty exposures in all were given, each of fifteen minutes duration, making a grand total of seven hours and thirty minutes direct exposure. The tube used showed the bones of the hand distinctly and dark gray in color. It was placed eight inches away and three amperes were used in the primary. The exposures were made alternately on the front and back of the scrotum. The scrotum and penis were well tanned though no dermatitis was set up.

Examinations of the semen were made after the third, seventh, eleventh, fourteenth, seventeenth, and twentieth exposures, and up to the twentieth exposure absolutely no change in motility, numbers, or shape was noticed. At that time it was found that there was a decrease both in numbers and motility. At the twenty-second treatment there was a slight further similar decrease, and at the twenty-fourth treatment there were very few barely motile spermatozoa present, and on August 1, after nearly three months and the twenty-fifth exposure, for the first time no spermatozoa, nor anything resembling them could be found. One week later a few misshapen forms were seen and thereafter up to July, 1907, twenty-three months after the last exposure absolutely no spermatozoa have been seen either by Professor Whitney or by myself. In this case there has been absolutely no diminution of sexual feeling, potency, or desire.

Case III.—A physician rendered absolutely sterile by the x-ray after a year's absence from the rays found complete return of the spermatozoa, and though now actively engaged in very extensive x-ray work, under suitable precautions to be sure, yet has a wife who is pregnant and undergoing an apparently normal pregnancy.

While it is not safe to draw conclusions from insufficient data, yet from the cases reported and my own, cited above, we may conclude that, while the x-ray can and does produce sterility, yet the quantity needed to produce such a result is much greater than one would suppose, reasoning from animal experimentation and from the hysterical warnings of certain writers.

We may also agree with Laquerrière that while a patient may be rendered sterile by the x-ray either with a direct or an indirect irradiation, that such a sterility may not be permanent and that a condition of complete sterility continuing through a number of years is compatible with perfect virility and genital competence.

Discussion.

Dr. Frauenthal.—I think the Doctor is to be congratulated upon his paper, because it puts a scientific light on the subject which has heretofore been misrepresented.

Dr. Eaton.—I do not rise so much to discuss the paper as to object upon one point in one case given by him. I am delighted with the paper and want to thank the Doctor for such a favorable report as to what may be accomplished in such cases. I wish to call attention to the method of treatment which I should adopt in a case of uterine hemorrhage associated with a fibroid, which I presume many other physicians adopt. Instead of depending upon the x-ray for control of that condition I should apply the positive pole of the constant current. In my treatment of these cases for two years I have failed to find a case where hemorrhage could not be completely controlled by the use of the positive pole applied internally, with the use of a large electrode for the negative external. I have seen severe cases. If there are some who have some difficulty about it, they might make use of the same method I have found always beneficial for stopping hemorrhages.

Dr. Brockbank.—My remarks are hardly apropos of the paper, but bear upon Dr. Eaton's remarks. It is a well-known fact, of course, that the positive pole of the current has a decided caustic action, usually controlling hemorrhage very well. I have one case in mind at present where I have to vary a little from the ordinary method of application. I used the internal intra-uterine electrode for some time with rather disappointing results. I discontinued the intra-uterine electrode and used a copper ball covered with cotton, saturated with a solution of sodium chloride applied to the cervix. In this one particular case I got very decidedly good results. I think you will find sometimes you have to vary treatment a little from the one principle, and what in one case does good in another does not. There is no need to be discouraged if the regular classical method of application does not yield results. I found in this one case especially a marked improvement after applying the copper ball directly to the surface and using as high as 120 ma. for fifteen minutes, without any local disturbance or inconvenience.

Dr. Eaton: This is a matter of considerable importance. I should have stated that I did not use an internal electrode applied to the internal membranes, but what the doctor has said—a copper ball which I covered in the cases with an antiseptic cotton and had it well saturated with sodium chloride solution, using it well up in the fornix. I do not hesitate to use 120 to 150 ma. for about fifteen minutes each time.

Dr. F. Barrett: This question is of great interest to me, for I have under treatment a lady aged thirty-seven, single, who

has been ill for seventeen years. The case was diagnosed, five years ago, as tubercular disease of the spine with abscess, and tubercular peritonitis. Her menses were normal. When she came under my care, I began treatment by giving positive insulation (static electricity) for one year, and then the high frequency vacuum tube discharge from an Ovington machine, at irregular intervals for nearly a year. In May, 1904, I began using the x-ray, with a tube of high vacuum, employing the current from a 12-inch coil, tube 18 inches from the body, for five minutes over the diseased area of the spine, and five minutes over the abdomen. Treatments were given every other day for six weeks, or until I had produced the tanning effect, and then twice a week for a year. Since then she had had no treatment of any kind until eight months ago, when I began treatment with the high c. p. incandescent lamp, over the whole spine and abdomen, giving twenty minutes' treatment three times weekly, with the result that she is able to walk with the slight aid of crutches, after having been confined to bed for three years.

The menses stopped eight months after beginning the x-ray treatment, and have not as yet reappeared, though she has gained in weight and strength.

I would like to know if anyone has had a similar experience, and if so, did the x-ray stop the menses, and how long was the patient under treatment?

Dr. Pitcher: I want to thank Dr. Granger for his scientific paper. It is of great value and shows the x-ray to be a two-edged sword, which can injure the operator as well as cure the disease. From the experiments conducted by Titus and others there is evidence to show the inhibiting effects of the x-ray, and that there is hope for the x-ray worker who has become sterile, i. e. if he lives to the age of eighty or ninety years he may recover the use of his procreative powers.

Dr. Dieffenbach: While abroad a few years ago my attention was often called to a circular by a Dr. Phillips of Bonn, who set out with the distinct purpose of producing sterility in certain conditions. This circular he sent out to the medical profession. It claimed that patients suffering from tuberculosis, syphilis, epilepsy, and degenerates as a whole should have the testicles and ovaries rayed and that prolonged radiation was one of the most efficient means to produce sterility. In certain cases of pregnancy where the female suffers from Bright's disease or cardiac lesions, which would render pregnancy dangerous to life, sterilization by means of x-ray seems indicated. I appreciate Dr. Granger's paper very much and his résumé I think was very complete. We as workers in this line cannot be too careful in protecting our patients and ourselves from this subtle force.

Dr. Granger: I had rather hoped we might hear from Dr. Titus as to the results of treatment of cases where there has been a loss of spermatorrhea. I understand he has been at work along that line.

Dr. Titus: I think I can verify your conclusions. My original conclusions upon the subject were that the sterility produced by x-radiation is only temporary, and with the use of ordinary static machines to improve the general nutrition and the action of light, true white light, is the direct antithesis to the influence of the x-ray. That has been borne out by experiments and by actual experience in its application in two cases that have been rendered sterile by the employment of the x-ray. I am very glad to be able to verify these observations you have made.

Dr. Granger: The only point I had in view was the real danger of sterility caused by a great number of exposures. Certain articles warn men not to go into the room with an x-ray tube in radiation. Furthermore people do recover from the effects eventually.

BIBLIOGRAPHY.

1. Brown and Osgood, Archives of the Roentgen Ray, No. 56, March, 1905, p. 213.
2. Albers-Schoenberg, Münchener med. Wochenschrift, October 27, 1903, No. 43, p. 1859.
3. Phillip, Fortschritte auf dem Gebiete der Roentgenstrahlen, December 9, 1904, Vol. VIII.
4. Lapowski, January, 1905.
5. Pinard, Progrès Médicale, January 29, 1906.
6. Lengfellner, Münchener medicinische Wochenschrift, No. 44, 1906.
7. Titus, Journal of Advanced Therapeutics, November, 1905, p. 646.
8. F. Villemin, Archives d'Electricité Médicale, May, 1906.
9. F. Villemin, Bullet. Médical, No. 24, 1906.
10. Bergonié and Trebondeas, Archives d'Electricité Médicale.
11. Ancel and Bouin, N. Y. Med. Journal, May 4, 1907.
12. Dr. Villemin, Journal de Physiothérapie, May 15, 1906.
13. Van Allen, Boston Medical and Surgical Journal.
14. P. Krause, Munch. med. Woch. September 4, 1906.
15. A. Laquerrière, Archives of the Roentgen Ray, No. 81, April, 1907, p. 324.
16. Brown and Osgood, American Journal of Surgery, April, 1905.

IS STERILITY AT WILL POSSIBLE UNDER THE APPLICATION OF THE ROENTGEN RAYS?

BY J. RUDIS-JICINSKY, M. D., CEDAR RAPIDS, IA.

"Throughout all the ages, wherever mankind has been grouped into those aggregations known as civilized nations, the supreme effort of the leaders has been centered on the development of the physical strength, skill, and progress of the citizen. The higher the degree of civilization, the greater has been this effort, and with the physical development of the individual came the protection for those, who should follow. The fact was recognized, that that country is strong whose men and women are themselves strong and that the nation may deteriorate, where excesses of men and women alike are indulged in, each succeeding generation thus becoming less able to meet the full requirements of perfect manhood and womanhood. Strong, healthy, and enduring men and women come not from weak and undeveloped mothers. Recognizing in these observations the laws of Nature and knowing how many cripples and innocent children suffer, and how many weak and anemic women there are with small pelves unadapted to child-bearing, prompted the thought, that the study of sterility at will might be expedient with an agent so potent as the Roentgen ray.

The etiology of sterility teaches us, that several organs actually are to be considered as involved as well as the ovum in the female and the spermatozoa in the male. Inflammatory processes in the ovary, chronic or acute, may result in sterility, likewise inflammation of the oviducts, or of the uterus adjacent tissues or vaginitis, not to mention imperfect development or marked malformations, but considered from the standpoint of artificial cause as local inflammation, which may constitute a bar to conception.

Successful regulation of sterility in the female and in the male as well, may be accomplished as demonstrated by experiments I have made with rabbits. In some cases under observation in which complete sterility was induced the subject again became fruitful. These observations in the line of actual experiments with rabbits, male and female, are rather

interesting as compared with the reports of the experience of some Roentgenologists as well as the writers.

Sometimes non-conception depends upon the general condition of the patient alone. I have selected with proper care for my experiments eight pairs of young, full-blooded Belgian hare rabbits in perfect health—and gave them the best of care and feeding and waited until they had borne a family. Each pair was properly isolated and after an elapse of three months of careful observation and investigation, including an inquiry into the possibility of an absence, or imperfect development of the reproductive organs, I applied the Roentgen rays to the lower portions of the bodies of the rabbits every day for 10 minutes, with low vacuum tube placed at a distance of six inches. The rays were passed through the opening in a compression diaphragm. The fluoroscope was the only guide as to the conditions of the tube, with which experience has made me thoroughly familiar. The tube gave a beautiful fluorescence and backed up a parallel spark-gap of two inches. After 21 exposures I placed the tube at a distance of 5 inches and rayed the animals for 20 minutes at one application. After this time no farther attempt was made to separate the animals, or otherwise interfere with their actions. Some of them still gave evidence that their reproductive organs were capable of conception and in two cases after 30 exposures it was really encountered. The males seemed to suffer the least. Five then gave signs of dermatitis, male and female, and were losing their hair more than the others. The inflammation with the artificially produced morbid process progressed rapidly and fecundation became impossible. It is hard to say that the spermatozoa were affected, but one thing is certain—the inactivity of the animals became profound, gradually increasing with the following exposures to the Roentgen ray. In all 126 exposures were made, when the sterility was complete in all the animals treated. The exposures were then discontinued and the rabbits were given all the liberties, and all the opportunities to recuperate, and after about 3 months *per viam naturalis*, the reproductive organs of the animals began again to manifest their activity and strength. An interesting fact observed was the fact that the males, especially, seemed to be possibly defective only in that the spermatazoa were affected,

for otherwise their sexual system was unaffected, they enjoying their sexual appetite as usual.

The microscopical examination of the seminal fluid of the males was made occasionally with high power only, and the filament of the spermatozoa, and some débris of the same, in some cases lost the activity after 21 exposures, when the procreative power ceased. In some of the animals we could observe that the vitality of the spermatozoa became impaired, and after 126 exposures atrophy of one testicle resulted in one case, which remained after three months of complete rest. The other males became normal again. Three females died from necrobiosis produced and the bodies were dissected. The destruction of the epithelial lining of the mucous layer of the tubes, with their cilia, was perfect, the degeneration of the other structures of the organs was marked, the Roentgen ray acting in these cases, as in others, as an irritant. In the tubes there were collections of blood, serum and pus, and plenty of scar tissue. Degeneration was found in the entire posterior horns and tracts of gray matter and the spinal canal was dilated. The barriers to conception seemed to be established beyond doubt, especially if we take into consideration that nearly the same conditions were found in the bodies of the other two animals killed purposely for dissection, not "killed" by the Roentgen rays. The rest of the rabbits are in general health at present, and nearly normal, and the generative organs as perfect as possible.

That our efforts might be attended with good results as demonstrating results from this research, it was necessary to go a little further and investigate the effects upon our patients, treated by the Roentgen rays for different lesions, skin diseases, etc., in the near vicinity of the sexual organs. In these unintentionally in some cases so exposed and treated in our practice we have produced sterility complete, or at least to a certain degree. And especially in the anæmic and nervous, and particularly in blonde patients, or all those suffering from spinal lesions as well as those who were more susceptible to the rays in general. Such is my own experience and the experience of others I am sure, as well as the personal experience of ourselves since we laughed about the possible injury to our own organs not protected during the Roentgen ray treatment. Now as a rule we know, that we have to be content to bear our burdens as best we may, with what amelioration the lead-apron will give, until the change to betterment ends the period of probation, or the injury itself will prove to be permanent. The dangers to the Roentgenologists are many, without considering the possibility of other pathological changes in our other organs, which demand our careful attention during every x-ray exposure and in the management of every case coming to us for treatment by the Roentgen ray.

TABLE SHOWING RESULTS OF EXPERIMENTS WITH EIGHT PAIRS OF RABBITS

Rabbits	Gender	Reaction	After Exposures	After 30 Exposures	Sper- mato- zoa	Acti- vity	Der- matitis	After 100 Exposures	Pathological Conditions	Microscopical Examination	Rest for 3 Months
First Pair	Male	10 Exposures	Sterility	Sterility	None	Fair	No	Sterility	Liquor Seminis Acid, No Spermatozoa	—	Normal
	Female	8 Exposures	Normal	Normal	—	Excel- lent	No	Same	—	—	Normal
Second	Male	7 Exposures	Normal	Sterility	None	Fair	Slight	Same	No Spermatozoa Debris of Same	—	—
	Female	11 Exposures	Normal	Normal	—	Fair	No	Same	—	—	Normal
Third	Male	10 Exposures	Normal	Normal	Pres- ent	Good	No	Same	No Spermatozoa	—	Normal
	Female	9 Exposures	Sterility	Sterility	—	No Good	Bad	Died from Necrobiosis	Inflammatory Conditions	Uterus Involved Tubes " " Ovaries "	—
Fourth	Male	8 Exposures	Sterility	Sterility	None	Lazy	Bad	Sterility	No Spermatozoa	—	Normal
	Female	8 Exposures	Sterility	Sterility	—	Fair	Very Bad	Died from Necrobiosis	Inflammation	All the Repr. Organs Involved	—
Fifth	Male	10 Exposures	Normal	Concep- tion	Pres- ent	Fair	No	Sterility	No Spermatozoa	Liquor Seminis Acid	Atrophy of the Left Testicle
	Female	9 Exposures	Normal	—	—	Fair	No	Same	—	—	Normal
Sixth	Male	10 Exposures	Normal	—	Pres- ent	Lazy	Slight	Same	No Spermatozoa	Debris of Nuclein	Same
	Female	10 Exposures	Normal	—	—	Fair	No	Died from Necrobiosis	Inflammation	In all the Repr. Organs	—
Seventh	Male	15 Exposures	Normal	Normal	Pres- ent	Fair	No	Normal	Normal	Normal	Normal
	Female	20 Exposures	Normal	Normal	—	Fair	No	Sterility	—	Normal	Normal
Eight	Male	16 Exposures	Normal	Normal	Pres- ent	Fair	No	Normal	Spermatozoa Present	Normal	Normal
	Female	18 Exposures	Normal	Normal	—	Fair	No	Same	—	Normal	Normal

CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

BY G. BETTON MASSEY, M. D.,

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CHAPTER III.

(Continued from page 591.)

Anodes composed of iron, metallic arsenicum, copper, and of silver—the last two coated with mercury—have also been experimentally used, but it was found that all, except silver, were inferior in a most marked degree to the first accidental combination of zinc and mercury. The exact value of silver-mercury cataphoresis has not as yet been determined.

GENERAL PROGNOSIS OF CANCEROUS GROWTHS UNDER CATAPHORIC STERILIZATION. This method is not one that acts by producing a mysterious effect at a distance through air-space and tissue, as in the case of Roentgen rays, but a simple application of the laws of phoretic diffusion to surgery, with possibilities only greater under certain conditions than the grosser art of tissue severance with the knife. The results are, therefore, due to the adaptation of a new surgical method to the varying anatomical problems of individual growths, and these problems have thus far received the close attention of but a handful of operators in a limited number of cases, the latter often badly chosen in the absence of a clear knowledge of the limitations of the method.

The results already attained show, nevertheless, that cataphoresis has a wide field of usefulness as a preferable method in the destruction of incipient growths in many portions of the body, judging from the small number of this class that have been placed under it. That the opportunities to employ it in this class have been so few is probably due to the general neglect of early treatment, added to which is the natural tendency of physicians to turn to a new treatment only in the most desperate cases, and after all other means have failed.

Cases properly classifiable as inoperable by the knife and by every other known method have therefore been the main source of the author's material in the development of the method, many having been undertaken in order that the patient might have the benefit of the doubt that still surrounded

the possibilities of the method and the uncertainty of the presence of metastasis. Under such conditions it has been most gratifying to the author, in reviewing his more than fourteen years' work with the method, that a large proportion of the patients treated have been greatly benefited; that a very small proportion have not been benefited or have been made worse; and that a few have had their lives saved, and have been actually cured when this result could not possibly have been secured by the use of any other known means.

In view of these facts it is evident that the classification of a given malignant tumor into the operable or inoperable lists will require new studies with cataphoresis available, for the possibly operable class is distinctly enlarged by this method.

In the end, it will be found that the most valuable sphere of cataphoresis will be to render treatment in the operable stage more attractive than it has been to the patient in the past, and thus to induce early resort to the surgeon; for in this stage it often offers a less fearsome prospect of blood and mutilation, with equal or better prospect of cure.

As to what constitutes a cure, great caution must be employed. To permit patients to believe that a cure has been reached as soon as the parts have healed with no disease manifest is most dangerous to their ultimate welfare. They should be distinctly warned that it is their duty to remain under regular periodical expert inspection for at least three years before a cure can be affirmed, though freedom from evidence of a pre-existent metastasis for one year after destruction of a tumor, with no local recurrences ascertainable by *expert* inspection, gives reasonable assurance of success.

This three-year limit for the development of latent germs of the growth in the locality of the wound, and of indubitable evidences of a pre-operative internal metastasis, is, of course, entirely arbitrary and subject to occasional exceptions. The greatest number of local and regional recurrences appear in the first three months when a sharp lookout is given the case, and the three-year limit means that each successive period of time is so increasingly free from new growth *not observable on close inspection in previous periods of time* as to reach a reasonable certainty of its non-appearance by the end of three years.

It is the author's belief that there has been too little expert

post-operative inspection of these cases, and that recurrences credited to the end of one and two years could have been discovered and destroyed within a few weeks or months after the operation.

So important is the need of mutual attention to these points on the part of both surgeon and patient, and a full realization of their true position on the part of patients, that those now discharged in good condition from the Oncologic Hospital are given a printed slip reading as follows: "In consideration of the absolute need of full co-operation between physician and patient that the best results may be attained in treatment, I hereby promise that when discharged from the hospital in good condition I will present myself to the surgeon in charge of my case, or to his delegated representative, at periods not less than three months apart for three years, and that if directed to return for further treatment I will make the utmost endeavor to do so."

(To be continued.)



Editorial.

ANTERIOR-POLIOMYELITIS.

THE recent epidemic of anterior-poliomyelitis has awakened a new interest in the investigation of the etiology and treatment of this affection. The epidemic character of the disease has given color to the germ theory of its origin, but so far no bacillus or other germ has been differentiated as distinctly associated with the affection at the site of the lesion in the spinal cord. The prevalence of diarrhea, fever, and other toxic symptoms associated with the onset of the disease would seem to indicate that the lesions arise from a general or localized toxemia, and that as in gonorrheal rheumatism, the germ may not be present at the site of the lesion. Whatever the cause of the trouble, the active process producing the symptoms is self-limited and of short duration; but the condition remaining has been shown to be an inflammatory process involving the anterior cornua, either throughout the length or in sections of the spinal cord.

The indications for the relief of the conditions are, *first*, the treatment of the acute inflammatory stage of the process, and, *second*, the early removal of the remaining congestion and restoration of the nutrition and activity of the neurons with a resumption of the functions which have been impaired.

It has too often been the case that the only treatment has been directed to the peripheral symptoms and not to the lesion in the cord. No greater mistake can be made by the profession than to ignore the central lesions and apply treatment alone to the peripheral conditions, neglecting the cause of those symptoms. The failure of drug therapy to relieve local congestions and the insufficient recognition on the part of neurologists and general practitioners of the efficiency of physical measures in relieving the central lesion, have resulted in a number of cripples which is deplorable. Until the profession at large recognize the fact that certain physical agents are capable of promoting elimination of inflammatory exudates and restoring tone and functional activity in affections of the spinal cord, relief will not be generally afforded.

At the onset in the suspected *first stage*, no indication of lost power of motion may be present. In fever conditions in young children associated with diarrhea, the possibility of anterior-poliomyelitis should always be suspected. In any event, when toxic conditions are present the indication is to induce active eliminations. The application of physical agents, light and heat, particularly the latter, is then most efficacious, because most pathogenic bacteria are susceptible to high temperatures, while the phagocytes are not relatively affected, and coincidentally the forced elimination of toxic materials with the perspiration, is favored under conditions which bring the blood to the surface and under the influence of heat in the skin, which is rendered hyperemic by the administration. The hot bath is not so effective because temperatures not so high can be employed. The effect of latent heat evaporation with dry heat under diaphoresis will therefore cause a greater degree of elimination through the skin. If possible under these conditions the body and limbs of the child should be placed in a dry hot-air apparatus or radiant light and heat bath, with the head outside, and kept there for twenty to thirty minutes, or in lieu of such apparatus, three or four gallons of boiling hot water in glass or tin containers wrapped in flannel cloths, wrung as dry as possible from hot water, placed alongside the child, who is then wrapped withal in flannel sheets to the neck, and allowed to remain for a considerable time, will be a very effective means of promoting elimination. This method of treatment is far superior to sinapisms or hot fomentations to the spine, though the former would have an additional advantage in drawing the blood to the periphery. Following the hot air application, the child should be kept warmly wrapped in blankets, and permitted to perspire freely. Ice bags to the spine are cordially advised by some authorities.

In the second stage—as soon as the acute symptoms of fever have subsided, and the paralysis is present, the child should be brought at once under active electro-static treatment. Apply a metal electrode to the whole length of the spine, for, though but a small part of the motor apparatus may seem to be involved, the trouble may be disposed to extend. In the administration of this current we are certain to influence the removal of the congested process if we apply the current with

sufficient intensity. Even in very young children a spark-gap of not less than four inches should be employed, whereas in a child of three and a half to five years of age, employing a metal electrode one and one-quarter inches wide, extending from the upper cervical region to the sacrum, a spark-gap of ten to twelve inches from a static machine having eight revolving plates, or the equivalent employing a current controller, from a static machine having a larger number of revolving plates, is indicated. The success or failure of the method will, as a rule, depend upon the early institution of the treatment, energy of the current employed, and the daily treatment and attention to technique. No pain or discomfort is caused by this administration if the clothing is dry; the youngsters making no protestations after the first few treatments, and, as a rule, fall asleep during the usual twenty minute administration.

For the treatment of peripheral conditions the indication is to increase the circulation and nutrition in the atrophied muscles and to institute passive movement corresponding with the normal movements of the affected muscles. The best means for increasing the nutrition is the application of gently applied frictional and interrupted mechanical vibration.

* * *

ELEMENTS OF PHYSICAL THERAPEUTICS.

IT has been often said to the Editor of this JOURNAL that the character of literature published is too advanced for those who are beginning to employ physical therapeutics and that something more elementary would be appreciated by the readers. In compliance with this request, beginning with the January issue, a series of papers will be published on the Elements of Physical Therapeutics, to appear in each subsequent issue of the JOURNAL until all of the subjects have been treated.

Progress in Physical Therapeutics.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Hydro-Electric Treatment of Functional Heart Disease. Dr. Gustav Zimmermann, Munchener med. Wochenschrift, March 21, 1905.

The hydro-electric treatment with the galvanic and faradic currents has proven useful. Experiments made by Eulenburg and his pupils have shown among other things, that the resistance of the water is indirectly proportional to its temperature; that even a slight admixture of salts decreases the resistance of water; and that the proportion of body length and the length of the tube, and of the cross-sections of the body and tube, has to be taken into consideration.

The sensibility of the skin and the frequency of the pulse are more or less lessened both in the galvanic and faradic bath, and the blood-pressure is increased. The excretion of urea is increased and the metabolism considerably augmented. The galvanic bath is sedative and hypnotic, while the faradic is refreshing and invigorating.

The favorable effect of the faradic bath is also noticed in the so-called alternating (sinusoidal) current bath, even in a stronger degree. The faradic current is uneven and the opening stronger than the closing current, while the alternating is a sinusoidal current with slowly and evenly increasing and decreasing E. M. F. The alternating current produces in motor nerves and muscles tetanic contractions, but only if applied with a much higher current strength than the faradic. In the alternating current bath the bather feels vibratory muscular contractions which are especially pronounced on thigh, upper arm, and chest, and appear as oscillating contractions.

In looking at the results of alternating current therapy we have to keep the subjective and objective results apart. Every objective improvement is preceded by a subjective, which often is striking and may in some cases be attributed to suggestion. Palpitation, shortness of breath, etc., considerably improve after a few baths, appetite and sleep become better, bodily and mental vigor increase in such a manner that the patients, at times, grow enthusiastic over the treatment.

In a good many cases the blood pressure increases, the pulse rate decreases, edema disappears, etc. But the author warns

against confounding hypertrophy, compensatory dilatation (hyperdiastole distention), and absolute dilatation. The hypertrophy of the cardiac muscle is a compensatory process and a sign of its strength, and should not be treated with the alternating current bath as long as it is functionally efficient.

Valvular insufficiency is, aside from the hypertrophy, compensated by an adequate dilatation and must not be submitted to this treatment.

The alternating current bath is only indicated when the dilatation is in excess of the compensatory measure, or when an absolute dilatation has arisen as the result of a gradual distention of the cardiac walls, either in consequence of a genuine weakness, an atonic condition of the muscle, or in consequence of unusual peripheral resistance to the circulation, fatigue, emphysema, etc.

The author advises the use of the alternating current bath in circulatory disturbances with decreased blood pressure, beginning disturbances of compensation, adipositas universalis with moderate fat infiltration of the heart, and atonic conditions of the heart muscle and the arteries.

♦ ♦

Cold to the Precordium in Typhoid Fever.

M. Leluc (in the Bulletin Général de Thérapeutique, No. 11, 1904) points out that the majority of the patients who die in the course of typhoid fever succumb to paralysis of the heart. This paralysis, which is generally attributed to alternations in the nerve centers, he believes is due to an alternation in the cardiac fibers as a result of prolonged fever. To combat this fever an ice-bag may be applied to the precordium in place of using general baths. When the temperature remains at about 102° F., and especially when the pulse is about 120, the constant application of an ice-bag surrounded by one or two layers of flannel will cause the pulse to fall to 100 and the temperature to 100° F. The other subjective and objective symptoms ameliorate as they do after a general bath, but with less fatigue to the patient.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

Permanent Cure of Ichthyosis by the Light Rays. By Corydon Eugene Rogers, M. D., Chicago, Ill. In the American Journal of Dermatology.

If Dr. Rogers has discovered a method whereby this intractable disease can be cured, he is to be congratulated. "One

swallow don't make summer," but it is the first case reported cured. We have tried all forms of treatment including Roentgen ray, with no permanent benefit. As ichthyosis is sometimes mistaken for eczema a correct diagnosis is obviously important. Dr. Rogers says the "New Light rays" used by him are only produced by an apparatus which changes the angularity of rays of light emanating from a high candle-power incandescent lamp so as to produce and project within a predetermined area, non-parallel beams crossing each other in sufficient numbers to form one or more exceedingly brilliant areas.

The brilliant areas are the penetrating point and the efficiency of the lamp will depend upon the perfection of their formation.

The rays cannot be produced by any groupings of globes, colored lamps, or screens. The single globe of 500 c.p. will fail unless installed in a hood of perfect and proper geometrical proportions.

[The author mentions only one variety of the disease "ichthyosis simplex," where there is thickening of the epidermis due largely to the increased formation of epithelial scales and the slow process of exfoliation. There is atrophic degeneration of the sebaceous glands and imperfect development of the panniculus adiposa.

Giovannum observed changes about the periphery of the sweat-gland ducts and mitosis of their epithelial cells. The thickening of the horny strata depresses the papillæ, causing more or less atrophic degeneration.

Dr. Rogers observes that Leloir and others have found peripheral degeneration of the nerves, which is no doubt true. At the present time it is believed to be due to congenital deformities of the skin and the disease which follows should be considered as a result, rather than the cause.

The case Dr. Rogers reports as the first in which the skin has been restored to its normal condition by therapeutic agents is as follows: Female, age thirty-three, birth premature, puny in infancy; but condition without special features until second year, when an eruption of medium-sized vesicles covered the whole head. Onset was accompanied by considerable febrile disturbance which the attending physician diagnosed as "scrofula." The vesicles dried and were followed by extensive desquamation leaving the integument normal; second attack occurred following October or November, as suddenly as the first, but instead of vesicles, the entire integumentary covering of the body was a network of minute fissures, the skin being cracked or checked in every direction. The body was anointed with olive oil and the fissures healed rapidly, leaving the skin covered with very fine scales. From this time the scales gradually increased in size. An attack of measles did not interrupt the course of the disease. When twelve years old

she had an attack of whooping cough from which she did not fully recover, and her medical attendant diagnosed pulmonary tuberculosis. Married at the age of twenty-two, never pregnant. Had pulmonary hemorrhages at the age of thirty-three, at which time she came under the care of Dr. Rogers.

Examination revealed evidences of tubercular condition of right lung, which also contained a cavity. Examining the skin he found the whole integument covered with large white scales, quite uniform in size, attached by one border in regular patterns closely resembling fish scales.

They were larger and more abundant upon the extensor surfaces, but the flexor and adductor surfaces, as well as the breasts, were fully covered, likewise the scalp. With no thought of curing the skin disease he employed the light rays in the usual manner for the treatment of the pulmonary trouble, but there was such pronounced hyperesthesia of the skin it was impossible. Upon closer investigation he found the apparent hyperesthesia was but a result of overheating the dry scales; that when these were well moistened there was no inconvenience, so the following course was adopted: The surface was moistened with warm water and this was followed by rubbing briskly with cream composed largely of starch. As the starch peeled from the skin in small rolls it removed most of the scales. This was followed by applications of the light rays as sharply as they could be endured, after which the skin was rubbed with an abundance of olive oil.

The skin treatment was at first solely for the purpose of making the rays tolerable in the treatment of consumption. But before the end of the first month I discovered that the condition of the skin was improving. For the first time in her life the patient observed perspiration upon those parts where the rays had been applied. Similar treatment was extended over the whole body. After a time she was so annoyed by the perspiration that she discontinued treatment, to which, however, she returned. Two years have elapsed and no return of tuberculosis or skin disease.

Dr. Rogers' theory of the action of the light rays upon the pathological condition is: "The hemoglobin of the blood gives off oxygen very rapidly under the rays and as it takes it up by the natural process in the same ratio, the blood is rapidly oxygenated, all toxic matter destroyed and the red corpuscles increase rapidly;" he says in many cases these changes occur so rapidly as to be incredible, and normal metabolism soon changes the pathological conditions.

SOCIETY MEETINGS.

TRANSACTIONS OF THE SEVENTEENTH ANNUAL
SESSION OF THE AMERICAN ELECTRO-THERA-
PEUTIC ASSOCIATION, HELD SEPTEMBER 17,
18, AND 19, 1907, IN COPLEY HALL, BOSTON, MASS.

(Continued from page 607.)

FIRST DAY, SEPTEMBER 17, 1907.

Afternoon Session.

Meeting called to order by the President.

The following paper was read: "Electric Treatment of Chronic Prostatitis and Enlarged Prostate Gland," by H. E. Pitcher, M. D., Haverhill, Mass. Discussed by Drs. Massey, Johnson, De Kraft, Snow, Bishop (of Washington), Eaton, Strobell, Gibson, Nealy, Geyser, Brockbank, Titus, Brinkmann, and Smith, and closed by Dr. Pitcher.

Following the precedent established in the morning session the following papers were placed at the bottom of the list: "Limitations of Electrical Treatment in Malignant Tumors"; "Roentgen Dermatitis."

The paper of Dr. Gibson, entitled, "Report of One Hundred and Fifty Cases of Tuberculosis," was postponed.

A paper on "Physiological Law Relating to the Effects of Physical Measures as Employed in Therapeutics," was read by Dr. Wm. B. Snow, M. D., and discussion was deferred until next scientific session.

At 4.15 the members and guests were taken by a special car to the Harvard Medical School under the supervision of Dr. Granger.

Evening Session.

The scientific session was called to order by the President.

The discussion of Dr. Snow's paper on "Physiological Laws Relating to the Effects of Physical Measures as Employed in Therapeutics," was taken up and taken part in by the following: Drs. Humphries, Bishop, Titus, Waite, Gibson, Pitcher, Brockbank, Wright, and Barrett, and closed by Dr. Snow.

Dr. Barrett gave a verbal report on "A Case of Lupus, Showing the Effects of Treatment by Concentrated White Light." Discussed by Drs. Geyser, Waite, Pitcher, Brockbank, Cannon, and Doubleday, and closed by Dr. Barrett.

A paper on "Electricity in the Diseases of the Eye, Ear, Nose, and Throat," was read by Dr. S. J. Harris, of Boston. Discussed by Drs. Brockbank and Humphris, and closed by Dr. Harris.

A paper on "The Treatment of Various Conditions by Static Electricity and the High Potential Currents," was read by Dr. T. H. Cannon, of Baltimore. Discussed by Drs. Frauenthal, Snow, Brockbank, Brownville, De Kraft, Torbett, Gibson, and closed by Dr. Cannon.

On motion the scientific session adjourned.

REPORT OF THE ELECTRO-THERAPEUTIC SECTION OF THE BRITISH MEDICAL ASSOCIATION.

The Therapeutic Use of Alternative Currents of Low Frequency.—Dr. E. R. Morton of the Electrical Department of the London Hospital, read a paper on the therapeutic value of alternating currents of low frequency. He said that a current slowly undulating and periodically reversing its direction of flow had always appeared to him as a therapeutic agent possessing great possibilities. So long, however, as the recent high frequency wave was passing over the electrical medical world there seemed little use in trying to get a hearing for any other form of electrical application. In the early part of the present year, Dr. Morton made his first communication on the subject of low-frequency alternating currents, and he has since continued to make use of them in both hospital and private practice. He finds them of special use in the electrical treatment of conditions due to atony or degeneration of muscular tissue. In the electrical reactions of muscle so affected, it is usual to find a prolonged latent period, a prolonged period of contraction, and possibly also a prolonged period of relaxation, which may not be complete until the current is cut off. The sum of these several periods might be called the "periodic time of the muscle." He insisted that the interval between the corresponding points of any two successive waves of the

therapeutic current should be not less than this. Within reasonable limits, the longer this interval—or, in other words, the lower the frequency of the current—the better.

With the low-frequency sinusoidal current no advantage is lost of the ordinary constant current, and all its disadvantages disappear. He produced the current by passing the ordinary direct current through an instrument such as Ewing's rhythmic reverser. In reply to an inquiry as to the conditions that were most benefited by this current, Dr. Morton stated that the greatest value was in the treatment of degenerations of muscular tissues, particularly the less chronic cases, such as are found in facial paralysis. It is also useful in atonic conditions of unstriated muscle, as in atonic dyspepsia and in constipation due to atony of the colon. The current was very well borne by children—much better than that produced by the ordinary form of interrupter. Dr. Morton confined himself to his own personal experience, which confirmed that of others who had studied the subject.

System in Radiography.—The value of stereoscopic examination was another subject which came in for considerable discussion; and although Mr. Mackenzie Davidson was keen in his advocacy of stereoscopy, his views by no means met with unanimous assent. The discussion arose upon two papers—one by Mr. Edward W. H. Shenton on "The Examination of the Hip-Joint," and the other by Dr. Ironside Bruce on "A System of Radiography." Mr. Shenton introduced his paper by decrying the attempt to apply geometrical exactness to the human frame: "There is no straight line of level surface anatomically; and though in the animal kingdom there is a wonderful similarity in the average relation of parts, there is yet infinitely trifling variation, which renders mathematical accuracy impossible. There are those who will localize a foreign body and give the result in millimeters; but consider what becomes of millimeters when the skin is cut and a wound gapes, or the part swells, or one of many physiological changes takes place!" He stated that the only way to carry out a radiographic diagnosis worthy of the name was to shut one's eyes to external appearance and one's ears to suggestion, and repeat to one's self: "What is there about this bone that makes it unlike the mental image I have formed of the normal one?" In his experience only one hip should be examined at a time.

Any effort to get two on one plate would waste the center field of illumination, which is, of course, the most valuable.

"In the normal hip there is an arch formed by the outline of the obturator foramen and the inner margin of the femoral neck. This line is a continuous one in all positions in which it is possible to examine the hip-joint, but it is best seen when the heels are placed together and the legs straight. In the various examples of this trouble which Mr. Shenton was able to show on the screen this line was distorted or discontinuous in every instance. He concluded with two principles always to be observed by radiographers in the examination of the hip-joint:

"1. To form a mental picture of the normal to fit over the abnormal.

"2. To keep an open mind when making a radiographic diagnosis. It goes without saying that the patient should be previously examined with the fluorescent screen."

Dr. Ironside Bruce in his "System of Radiography," spoke also of the importance of the normal skiagram of bones and joints. He said that "in cases of injury to the bones or joints there never really ought to be two opinions, once a good radiogram is produced." As to stereoscopic views of the bones, he thought that theoretically their utility was great, but their usefulness depended on their being able to view the bones really as they appeared to the naked eye in the dry state, which result could only be obtained with a perfect stereoscope and skilled observer. He did not think the stereoscope as now constructed perfect, and if it was, the labor and expense entailed was a drawback. Dr. Bruce said that he had constructed an atlas containing radiograms of normal bones and joints of the whole body, which, however, would be of no use unless the normal radiograms and the abnormal would be identical so far as concerned the relation between the focus-tube and the particular region of the body. "Dr. Bruce arranged an X-ray couch with a plumb-rod and measuring arrangement, showing the exact course of the normal ray. The production of exactly similar views of any part of the body was accomplished by placing the anode of the focus-tube immediately beneath some easily found anatomical point. A further essential for satisfactory comparison was a series of normal views

at different ages so as to show the epiphyses. He selected the ages of five, fifteen, and twenty-five years."

He referred to the difficulties of the reproduction of X-ray photographs, the most serious of which is the production of the *process bloch*, which causes a great loss of detail. "In ordinary work this is overcome by liberal touching up, but it is obvious that to retouch a collection of normal radiograms is to render them of no value. If, on the other hand, no touching up is permitted, the radiograms of the thicker parts when printed lack much of the detail present in the original." He exhibited his atlas, in which no touching up was done from start to finish.

In the discussion, Mackenzie Davidson expressed regret that these talented workers did not use stereoscopy. To anyone who possessed binocular vision, and was familiar with a very moderate amount of mathematics, stereoscopy made everything plain. Surgeons were often not very skilled readers of X-ray photographs, but if a stereoscopic picture were put before them it was usually absolutely convincing. We live and see in three dimensions; why not work as radiographers also in three dimensions? Stereoscopy only needed the expenditure of a second plate and very little more trouble.

Mr. Shenton objected to stereoscopy principally on the ground of expense. Dr. Bruce said that his objection to the stereoscope was on the ground of expense alone.

The Measurement of the Brim of the Female Pelvis by Means of the X-rays.—Dr. J. R. Ridell read an interesting paper on the above subject. The difficulties recognized in this work lie in the fact that the plane of the pelvic brim and the plate on which the shadow is cast are not parallel, but lie at an angle to each other and that the plate cannot be got close to the brim, nor can it be placed always at the same distance from it. He described the method of Contremoulins, which consists in applying stereo-radiography, and of Dr. Morin, of Nantes, in which the patient is radiographed in the dorsal decubitus. The former method Dr. Ridell considers fairly accurate, and the latter most inaccurate. His own method is to make a radiogram of the inlet under certain definite conditions, and eliminate the error by calculation.

1. The plate is so placed as to rest on the most posterior part of the sacrum and on the tuberosities of the ischia.

2. The plane of this plate will be at a definite angle with that of the pelvic inlet, which will be nearly the same in all cases.

3. The distance between the plate and the center of the pelvic brim will be about 3 3-4 inches, and will never exceed 4 1-2 inches.

The patient is placed face downwards on a canvas-covered couch with the focus tube in a movable carrier underneath. A small air-bladder is placed between the abdomen and the couch. The fluorescent screen is placed on the patient's back, so as to show the outline of the pelvic brim.

The tube is then placed in such a position that the normal ray falls perpendicularly on the plane of the inlet. The tube is then adjusted to a point twenty-four inches distant from the screen. The plate is placed on the patient's back resting on the tuberosities of the ischia and the sacrum, and in this position a skiagram is taken. The radiogram thus produced differs from the actual pelvis in that it is enlarged owing to the divergence of the rays. It differs in other ways, but the distortion is so small that it may be neglected.

The objections to this method apply equally to other methods, while Dr. Ridell claims that it has the merit of simplicity.

The Electro-Diagnosis of Oculo-Motor Paralysis.—A paper on this subject, by Professor Wertheim Salomonson, was read by Mr. Deane Butcher. "It is often stated that the human eye muscles do not contract when electrically stimulated. In normal persons none of the ocular muscles can be stimulated effectually; but, according to Professor Salomonson, in certain pathological conditions, such as paralytic ptosis, the levator palpebræ superioris may be stimulated so as to react by contractions. A current of 1 to 3 milliamperes causes a slight lifting of the upper eyelid to the extent of a few millimeters at the utmost. In cases of complete oculo-motor paralysis the first contraction may generally be observed about the twelfth to the fourteenth day after the outset of the paralysis. From the fourteenth day the necessary current strength to produce the contraction diminishes rapidly until about the twenty-fifth or thirtieth day. At that time it has even been possible to produce a contraction with 0.03 milliampere, and with an electro-motive force of only 4 volts. The motor point is situated a few millimeters beneath the center of the

eyebrow. The electrode should be a small brass button or knob of about 5 millimeters in diameter, well covered with a moist cloth.

"The diagnostic value of the symptom consists in the possibility of distinguishing between the supranuclear and peripheral lesions. Moreover, it enables us to diagnose severe, intermediate, and slight cases. It has also a prognostic value, in that it shows when regeneration of the nerve is beginning, this being always accompanied by a rapidly decreasing excitability."

Ureteral Calculi.—Mr. A. D. Reid presented a paper on this subject and showed his instrument for locating a stone in the kidney during the course of an operation. "It is comparatively easy during an operation to localize by palpation a large calculus in the kidney, but it is often a matter of great difficulty to feel a small calculus in the depths of the calyx or in the substance of the kidney, and the organ has often to be mutilated severely before it can be found. Mr. Reid found that in using the fluorescent screen in the kidney after it has been delivered, there has been risk in the past of introduction of sepsis, which lead to the introduction of the cryptoscope.

This apparatus consists of an aluminum cup, 3 1-2 inches in diameter, at the bottom of which is placed the fluorescent screen, which is kept in position by a wire spring. The bottom of the cup, being of aluminum, is quite transparent to the rays. Over this cup slides a cylinder of aluminum. This bears at its upper end two tubular eye-pieces, and the arrangement of the cup and cylinder is such that the screen can be adjusted at a suitable distance from the eye of the operator. The screen is completely embeded in celluloid, and the whole apparatus consists of three pieces, all of which can be completely sterilized. The kidney is exposed in the ordinary way, and brought out on the loin. The tissues around the kidneys are then pressed down from the organ by means of a special retractor, also of aluminum. In the central portion of this plate-like retractor a hole is made of sufficient size to allow the kidney to pass through it. The tube is adjusted so that it can readily be brought opposite the exposed kidney. When the organ has been delivered, the retractor is placed in position and the kidney examined directly by the cryptoscope. It is then possible to see the smallest fragment of calculus in the

kidney and to localize its position accurately, when it is a matter of comparative simplicity to make a small incision over each calculus and to remove it."

Treatment of Lupus, Ulcer, and Paget's Disease by the X-rays, by Dr. J. Goodwin Tomkinson. The writer has been using the X-ray for some time in the treatment of lupus vulgaris, and has kept two objects in view: the relative shortness of treatment and satisfactory results from an esthetic point of view.

He first removes any crusts that may exist with a salicylated ointment, followed by a tentative X-ray exposure of 3 to 10 minutes. In a few days the X-rays are employed for a few minutes daily upon the area of the lesion unless contra-indicated, until the whole lesion has been gone over some three or four times. He then applies a Unna's plaster, 50 per cent. salicylic acid and creosote Phlastermulle, renewing the same daily. "If not well borne, the part is previously swabbed with a 20 per cent. solution of cocaine. In a variable number of days it is found that much of the tuberculous tissue has come away. The lesion is then swabbed with the cocaine solution, dried, and afterwards painted with the following preparation:

B. Acid. carbolic50 per cent.
Acid. lactici15 per cent.
Acid. salicylici15 per cent.
Alcohol absolut.20 per cent.

"A few minutes afterwards the lesion is painted with the following solution:

B. Acid. carbolic80 per cent.
Alcohol absolut.20 per cent.

"After cauterization, the part is dressed for a day or two with sterilized lint and carbolic oil (1 in 30), and afterwards with 20 per cent. aqueous solution of ichthyol until healing has taken place. The X-ray treatment is then recommenced, short exposures of three to five minutes—rarely longer—being made. At the end of three or four months the treatment is discontinued for a considerable time.

"At the end of this interval, usually some months, the patient is submitted to a second course of treatment, which is again repeated if necessary."

A Case of Paget's Disease Treated by the X-Rays.—Dr. James Taylor described a case of Paget's Disease that healed under the influence of the X-rays. When the patient first came, there was a large ulcer on the breast, with copious discharge, with no tumor to be felt in the breast itself. After a few treatments with the X-ray, new skin began to grow in from the edges. Finally, after fifteen applications, extending over a period of two months, the ulcer had completely healed. During this time a tumor made its appearance in the substance of the breast, and enlarged rapidly so that the breast had to be amputated. While the skin had healed, the tumor had grown rapidly, indicating that the rays had had a strong stimulating effect upon the epithelial growth.

The Rationale of Static Currents, by Dr. F. Howard Humphris, of Honolulu. He demonstrated the value of static electricity, but, however, made no claims for its effect upon organic or structural change. He dealt in turn with the four different kinds of effects produced by static currents—mechanical, electrical, chemical, and actinic. In their mechanical action these currents cause tissue contraction—not only contraction of the skin and muscle, which could be seen, but also contraction of the protoplasm within. Answering criticisms as to the static currents being merely “skin currents,” Dr. Humphris said that the best physicists of the day were now agreed that the static currents did traverse the body, passing along the course of least resistance. Since the skin was a worse conductor than the moist tissues beneath it, it was impossible to imagine that the current would merely flow over the skin when it could go through the tissues. The therapeutic effect of the current was constitutional as well as local, this being evidenced by the increased elimination of urea and other extractives, the production of perspiration, the alteration in arterial tension, the increase of carbon-dioxide, and the general feeling of *bien-être*. The electrical effects of the currents, producing in the tissues an active metabolism, were partly due to the polarization of the cells through which the current passed and partly to mechanical action. Polarization of the cell elements induced cellular activity. The currents acted chemically by the evolution of nascent ozone and nitrous acid, which from their very nature were fatal to such bacteria as the staphylococcus and streptococcus. They also acted actinically, by the germ-de-

stroying effect of light, by the possible diminution of certain toxins, and by the increasing of oxidation processes. Almost all disease, Dr. Humphris said, is due to, or accompanied by, congestion during its course, or *stasis*. He held that each of the four actions of the current contributed in its own way to the relief of stasis, and with the relief of the stasis came the relief of the disease.

The Use of X-rays from the Point of View of the General Practitioner.—Dr. Ellis Pearson, one of the honorary secretaries of the section, gave a survey of work in which X-rays entered both as diagnostic and therapeutic measures. He said that no responsible person had ever definitely stated that X-rays were a cure for cancer, and he thought that those interested in this method of treatment were to be congratulated on the very guarded opinion they had always expressed as to its use in this disease. But any treatment that exerted even a slight beneficial influence on cancerous growth was worth their consideration, and it could not be doubted that cases of cutaneous carcinoma and epithelioma had been cured by the X-rays.

Practical Demonstrations.—Drs. Hugh Walsham and Halls Dally gave a number of orthodiagraphic tracings of healthy chests. By this method of examination "normal incident ray" is conducted round the entire circumference of the organ under investigation, and the exact size of the organ can be mapped out. By this method he claims that they were able to measure motionless objects to within the fraction of a millimeter.

"One of Dr. Halls Dally's tracings showed a case of very early pulmonary tuberculosis affecting the left apex, in which the limitation of diaphragmatic movement on the affected side was clearly indicated. The infracostal angle on the same side was diminished. This tracing supports the observation that unilateral limitation of diaphragmatic movement is often the earliest sign of pulmonary tuberculosis."

AMERICAN ROENTGEN-RAY SOCIETY.*

Eighth annual meeting held in Cincinnati, Ohio, October 2-4, 1907.

The President, Dr. P. M. Hickey, Detroit, in the chair.

*Abstracted from the Journal of the American Medical Association.

The following officers were elected for the ensuing year: Dr. E. W. Cauldwell, New York City, President; Drs. Kennen Duncan, Cincinnati, A. L. Gray, Richmond, Va., Lewis G. Cole, New York City, M. K. Kassabian, Philadelphia, and J. W. McMasters, Toronto, Canada, vice presidents; Dr. Geo. C. Johnston, Pittsburg, Pa., secretary; Dr. Chas. H. Bowen, Columbus, Ohio, treasurer; executive committee (for three years), Dr. Percy Brown, Boston, Mass.

The next annual meeting will be held in New York City, at such time as the executive committee may designate. The following papers were read and discussed.

Developers.—Dr. Henry Hulst, Grand Rapids, Mich., opened a discussion on the above subject, claiming that almost any developer would do good work providing the operator was thoroughly familiar with it. Hence many excellent developers were in general use, but rarely the same formula is used by two men, each modifying it to suit his own convenience. Dr. Hulst uses a developer of hydrochinon, in which to one quart of water he adds potassium carbonate until it reads 1,060 by hydrometer. Then he adds six drams of sodium sulphate, one-half of an ounce of hydrochinon, and two ounces of a ten-percent. solution of potassium bromide, in water. With this solution the high lights are expected to appear in from thirty to forty seconds. If it appears earlier or later, some of the potassium solution is added, according as it is needed. The developer is said not only to give good contrasts, but also good detail. The use of the hydrometer in determining the correctness of the mixture was emphasized.

Roentgen Ray in Cancer.—Dr. Ennion G. Williams, Richmond, Va., emphasized the necessity of differentiating cancer cases clinically, if the Roentgen ray is to be gauged properly. He classifies them as follows: (1) Includes lesions in the skin surface advanced beyond keratosis. (2) Those more advanced of the first class, which has invaded the subcutaneous tissues. (3) Includes extensive, recurrent, and metastatic growths in the deep structures. (4) Includes carcinomas of the mucous membranes. (5) Includes primary carcinoma of the breast, and the sixth class includes recurrent carcinoma of the breast. Of 53 cases of the first class, 52 patients were

healed, an attack of pneumonia proving fatal in the one unhealed case. In four of the cases there were recurrences which were healed with the ray, and the patients have remained healed, one patient being well after four and a half years. Of 17 cases in the second class, in all of which a primary operation had been done, 4 patients were improved; 2 remained unimproved, 5 were healed temporarily, but had a recurrence, and 6 remained well. Of 9 cases in the third class 5 cases remained unimproved, 2 were improved temporarily, and 1 patient had a recurrence. In cases of classes four and five the author advises excision first. Thirteen cases were reported in these two classes. Of 15 cases in class six 3 were improved, 7 showed great improvement in reduction of size of growth and relief of pain; in 5 the tumor disappeared, but recurred in 3. The remaining 2 patients are well after two and a half years and four months respectively. The author states that precancerous and cancerous conditions can be eradicated entirely in their early stages by means of the Roentgen ray, and remain so without leaving a scar and without danger to the individual.

Discussion.

Dr. Chas L. Leonard, Philadelphia, stated that the scirrhus type of carcinoma of the breast is particularly amenable to Roentgen-ray treatment, but advised that the treatment be instituted before the patient is operated upon, because he has found that operation stimulates these tumors to growth and they very soon become malignant in character. In the more malignant tumors, he advised early operation, followed by the use of the ray.

Dr. Geo. E. Pfahler, Philadelphia stated that superficial cancers are amenable to x-ray treatment, but that the type involving the mucous membranes should first be subjected to excision before the ray is used. In primary carcinomas of the breast excision should be followed by x-ray treatment.

Dr. H. F. Bettjer, Baltimore, Md., did not think that cases of epithelioma in which there was danger of metastasis should be treated with the Roentgen ray alone or by excision alone. He referred particularly to epitheliomas of the lower lip.

Dr. Geo. C. Johnston, Pittsburg, failed to see how exposure

of a cancer of the lower lip could be expected to effect a cure, when there are present metastases as far down as the mediastinum, as in one case he cited. He also condemned the usual surgical operation in which only the local lesion is excised without any heed being given to the carcinomatous glands in the neck and lower down.

Postoperative Treatment of Carcinoma.—Dr. Walter B. Hill, Cleveland, Ohio, claimed the only rational treatment of carcinoma is early and radical operation, followed at once by the x-ray. After removing as much diseased tissue as possible, the wound should be packed, suturing being omitted entirely. On the second day after the operation the packing is removed and the whole denuded area is exposed to the Roentgen ray. If necessary, carry the x-ray to the point of producing a slight dermatitis, giving treatment every other day with a tube of medium vacuum, about a Walter 4, the rays being passed through a filter of leather or aluminum, requiring about 15 or 20 treatments.

Discussion.

Dr. Kennon Dunham, Cincinnati, agreed with Dr. Hill as to the early use of the ray after operation, and that the wound should not be sutured.

Dr. Geo. C. Johnston, Pittsburg, pointed out that post-operative raying is of advantage because of the fact that often metastases have formed and been overlooked by the surgeons because there was no external evidence of such spread, and the Roentgen ray is effective in just such cases. The wound, the mediastinum, and the axilla can be rayed immediately after the operation, and it has been shown that in many instances such raying is most effective in preventing a recurrence and in disposing of any new growths in these regions.

Dr. A. G. Cole, Indianapolis, had little faith in the post-operative treatment of carcinoma when the primary tumor was situated under the skin.

Dr. Geo. E. Pfahler, Philadelphia, referred to a case where recurrence took place one or two years after the operation, causing paralysis of the arm. The x-ray was used and, after three years, the patient is entirely well. He did not agree with

Dr. Cole that the deep-seated cells cannot be reached by the ray.

Drs. McCollin and Leonard, Philadelphia, and E. G. Williams, Richmond, Va., also agreed that the rays can reach the deep-seated cells equally as well as the superficially placed cells and cited instances to prove their statements.

Roentgen Ray in Sarcoma.—Dr. Geo. E. Pfahler, Philadelphia, reported twenty-two cases of sarcoma in which the ray was used successfully in a number of instances, but the ultimate result was good in only a very few cases.

Discussion.

Dr. Russell H. Boggs, Pittsburg, was not very sanguine as to the results of the x-ray in sarcoma, but he called attention to the fact that these cases are not seen until the disease is very far advanced, which may account for the lack of better results. One of his patients, who has had a sarcoma of the clavicle, has remained well for six months. In four post-operative cases there has not been a recurrence.

Dr. John W. Hunter, Norfolk, Va., stated that small sarcomas should be rayed until they are freely movable, and then be removed, and that post-operative raying will then dispose of any remaining tumor cells.

President's Address.—Dr. Preston M. Hickey, Detroit, reviewed the history and growth of the society and pointed out how its work can be furthered by the members and the value of the Roentgen ray demonstrated to the best advantage. Its uses and limitations were not overlooked.

Protection of Operator.—Dr. Chas. L. Leonard, Philadelphia, stated that the results of exposure to the x-ray are due, in a large measure, to injury of the trophic nerves and a consequent decreased nutrition of the tissues. He said that the area involved extends beyond the visible lesion, hence local medication with stimulants is contraindicated until after recovery of the trophic nerves from the injury inflicted. The lesions should be let alone and protected from further irritation. He considers prophylactic treatment to be the best, the radiation being confined to the area to be examined or treated,

which is best done by surrounding the tube with sheet lead, six pounds to the square foot, inclosing the active hemisphere of the tube. There should be an air insulation of four inches on each side of the tube. The author has found immersion of the hands in hot water the best treatment for these burns, and after sufficient time (years) has elapsed for the nerves to regain their tone, skin grafting may be resorted to to restore lost tissue or to replace an indolent ulcer. He condemned the use of any ointments, no matter what the composition.

Protection of the Patient.—Dr. Russell H. Boggs, Pittsburg, emphasized the value of filters, and time of exposure, as prophylactic measures, and the susceptibility of tissues and the stage of maturity of tissue cells as factors in producing burns. He advised that the operator protect organs that are really influenced by the ray, such as the reproductive organs, the liver, spleen, kidneys, in fact any of the organs made up of epithelial cells.

Discussion.

In the discussion of the two preceding papers, the speakers all emphasized the importance of not being exposed to the rays, either primary or secondary.

Dr. Chas. H. Bowen, Columbus, Ohio, described a cabinet he had devised. From within this he is able to carry on all his work without any exposure to the ray. Others have had their offices built in such a way that a solid wall of sheet lead is interposed between the radiographic room and the office and other working rooms. By means of mirrors and other devices the action of the tube is watched and perfect regulation is possible. It was generally conceded that it is not necessary for the operator ever to come within the reach of an excited tube, and that the skin of the operator should be the first and most important consideration, because he is exposed to the rays every day and all day, and the patient is exposed for a short time only.

Radiography of Fractures.—Dr. Arthur Holding, Albany, N. Y., emphasized the importance of making a radiograph in all cases a practice before and after the dressing is applied, or, if two exposures are refused by the patient, to make at least

one after the dressing is applied, so that the results of the setting of the fracture may be noted. Cases were cited to show that many apparently perfect results are shown to be very imperfect if a radiograph is made.

Non-Tuberculous Arthritis.—Dr. Albert H. Freiberg, Cincinnati, referred to the errors which are likely to be made in interpreting plates made of non-tuberculous forms of arthritis, these errors being the result of insufficient familiarity with the pathologic anatomy and the character of the process. He also dealt on the value of inflating the joint with oxygen as a diagnostic aid.

Early Radiographic Diagnosis of Pulmonary Tuberculosis.—Dr. Lewis G. Cole, New York City, showed by clinical observation and post-mortem studies that most of the residents, 98 per cent., have at some time in his life been the subject of a tuberculous process in his lungs. It could not be determined in any particular case whether the process is active or not, unless the lungs are skiographed at regular intervals. Tuberculous infiltration of the lungs can be determined by means of a radiograph long before any physical signs can be detected, and Dr. Cole cited a number of instances, citing the subsequent history of confirming diagnosis. In several instances the first evidence of pulmonary disease was hemoptysis, apparently negative, but a radiograph showed pulmonary tuberculosis very distinctly. Dr. Cole believes firmly in the efficiency of the x-ray in making an early diagnosis of pulmonary tuberculosis. He showed a large number of lantern slides and negatives to prove his statements.

Discussion.

Dr. A. W. Crane, Kalamazoo, Mich., agreed with Dr. Cole that it is possible to get evidence of pulmonary tuberculosis by means of the radiograph long before any physical signs can be discovered.

Dr. Henry Hulst, Grand Rapids, Mich., said that, while the radiograph will disclose early tuberculosis, it is equally true that, in some cases, the bacillus might be discovered in the sputum and not in the radiographic findings. He believes that the ray is of great value in incipient tuberculosis, but its great

value lies later in the disease. The ray will not record changes until they exist and it is difficult to correctly interpret negatives. Clinical data are of considerable value in this connection.

Dr. M. P. Hickey, Detroit, said that the x-ray is simply a recorder of densities and must be regarded as such; and that to try to establish that a certain density is tuberculosis is treading on dangerous ground.

Dr. Geo. C. Johnston, Pittsburg, and Dr. Geo. E. Pfahler, Philadelphia, agreed with the author that the x-ray is a valuable aid in the diagnosis of the early stage of tuberculosis and each cited cases.

Roentgen Ray in Leukemia.—Dr. Joseph F. Smith, Chicago, recapitulated the experimental studies of the action of the Roentgen ray in leukemia and the clinical aspects of the treatment. The author found that the Roentgen ray produces in leukemia a disintegration of the leucocytes, particularly the younger cells, such as the myelocytes and the non-granular mononuclear cells. The serum of a patient improved by Roentgen treatment injected into animals causes leucopenia. Added to the leucocytes of another individual in the hanging drop it disintegrates the cells, having a selective action for mononuclear cells. The strength of the leucolytic action seems to be proportionate to the clinical improvement of the patient under treatment. The serum of the treated patient agglutinates normal red corpuscles, the degree of agglutination varying, roughly, with the leucolytic action. The injection of a strong leucolytic serum from a leukemic patient clinically improved by Roentgen treatment into an untreated patient suffering from lymphatic leukemia causes a decided and rapid fall in the number of leucocytes, the mononuclear elements being first affected.

Drs. Henry K. Pancoast and Alfred Stengel, Philadelphia, reported on 123 cases of leukemia treated with the Roentgen ray. Of 63 cases final reports were obtained as follows: Permanent cures after three to six years, 6.35 per cent.; died, or in chronic condition at time of last report, 87.3 per cent.; remainder still under treatment. The authors conclude that the Roentgen ray does not offer much hope of ultimate success; on the other hand, it has some virtues on account of a decided

and powerful therapeutic action. Primary symptomatic cures were effected in 39.5 per cent.; initial improvement in 28.5 per cent.; total cases more or less benefited, 68 per cent.; no favorable action, 25.5 per cent. A more rational and scientific method of employing the Roentgen ray gives reasonable assurance of better results in the future. The treatment must not be prolonged unnecessarily and early splenic exposures should be avoided. The length of each exposure should not be more than 15 minutes, so as to avoid toxic reactions; shorter exposures to be given if necessary. A rapid and decided drop in the number of leucocytes is most undesirable and is a bad sign.

Specific Immunity and Roentgen Ray Therapeutics.—Dr. A. W. Crane, Kalamazoo, Mich., thought that the Roentgen ray possesses the power of introducing some substances into the tissues that has an opsonic power. He found that the opsonic index was higher before the raying than after, but only in the tissues with which it is brought in contact. The treatment to be effective must be given with sufficient intensity to set free the substances concerned in raising the index. The length of exposure and extent of tissue exposed should be so regulated as to produce a small negative phase or none at all. The frequency of exposure should be governed by the application of the negative and positive phases, and in conditions where the disease-producing agent has not yet been discovered, one should be governed by knowledge from those cases in which opsonic observations can be made. It is not necessary to expose all the diseased area to effect a cure, and not repeat the treatment more than twice a week. The least treatment will give maximum results. The author's observations were made on acne, lupus, and tubercular glands of the neck.

Goiter.—Dr. Geo. C. Johnston, Pittsburg, Pa., said that the exophthalmic variety of goiter is particularly suitable to Roentgen-ray treatment because it produces inhibition of function. Results are fully equal, if not superior to, those obtained by operation. The exophthalmos disappears early; tachycardia disappears more gradually, but is usually progressively less, and the gland itself is reduced in size and restored to normal conditions. The nervous symptoms are always lessened. The

author reported one case in which the results were excellent. The cystic goiter is least amenable to x-ray treatment. Dr. Johnston advises that this method of treatment be tried before operation but insisted that it be continued for a long time, and that relapses be treated by further radiations. He employs a tube of high penetration. Post-operative thyroidism is rarely seen where intelligent treatment with the ray is carried out.

Discussion.

Dr. Kennon Dunham, Cincinnati, reported three cases of exophthalmic goiter in which the ray produced a cure after all medicinal treatment had failed. Dr. Chas. L. Leonard advised a very careful selection of cases for x-ray treatment. In the cystic variety the treatment is usually a failure, whereas in simple exophthalmic variety it gives excellent results. Dr. Geo. E. Pfahler agreed with the author that cases of Graves' disease yield more readily than the others. Simple goiters are reduced somewhat, but do not disappear completely.

Several additional papers were also read.

BOOK REVIEWS.

ROENTGEN RAYS AND ELECTRO-THERAPEUTICS, with chapters on Radium and Phototherapy. By MIHRAN KRIKOR KASSABIAN, M. D., Director of the Roentgen Ray Laboratory and Instructor in Electro-Therapeutics in Medico-Chirurgical Hospital and College; Member of the Philadelphia Medical County Society; Pennsylvania State Medical Society; American Medical Association; American Roentgen Ray Society; Vice President of the American Electro-Therapeutic Association; New York Medico-Legal Society, etc., etc. 245 illustrations. Philadelphia and London, J. B. Lippincott Company.

It has been the author's aim in the preparation of this work to present clearly and concisely the most important facts pertaining to electro-therapeutics and the Roentgen ray. One hundred and fifty-five pages of the volume are devoted to electro-therapeutics and 371 pages to radiography and radiotherapy. The chapters on electro-therapeutics consider briefly the various electrical currents and other modalities, and in the space devoted to the subject have accomplished what was the author's purpose—clearness and conciseness—at the expense of the fullness of therapeutic technic.

In the other part of the work the writer has likewise taken pains to follow the modern authorities and has at the same time done himself justice in his originality, demonstrating himself to be a master of the art. In this department he has not sacrificed completeness of detail and has given the profession results of his personal research as well as a review of the literature to the present time. The work contains many graphic and original plates and drawings of unusual interest and merit, and it can be truly said that no writer to the present time has given a more practical and thorough treatise than this. We cordially commend the work to the medical student and practitioner. The work is published on good paper and in good binding and has a full index.

THE INTERNAL SECRETIONS AND THE PRINCIPLES OF MEDICINE. By CHARLES E. DE M. SAJOUS, M. D., Fellow of the College of Physicians of Philadelphia; Member of the American Philosophical Society, the Academy of Natural Sciences of Philadelphia, etc.; Knight of the Legion of Honor and Officer of the Academy of France; Knight of the Order of Leopold of Belgium, etc. Formerly Lecturer on Laryngology in Jefferson Medical College and Professor of Laryngology and Dean of the Faculty in the Medico-Chirurgical College; Formerly Professor of Anatomy and Physiology in the Wagner Institute of Science. Volume Second with 25 illustrations. Philadelphia, F. A. Davis Co., Publishers, 1907.

In this volume and the preceding one Dr. Sajous has opened up an entirely new field the significance of which must be recognized as a step forward in the revelations of the hidden physiological truths upon which much of the regulation of the physical functions of the body depends. The relation of the pituitary body, the thyroids, the adrenals, and other glands so essential to the body functions have been explored in these works as never before in the history of our profession, and while there may be much still to be confirmed, the world is certainly indebted to Sajous for the investigations he has made and the facts and theories that he has evolved concerning the functions of these bodies and their relation to other physiological functions in the organisms. The complex relations of the pituitary body, the thyroids, the adrenals (including the parathyroids) are believed by the author to be functionally united, forming what he terms the "adrenal system." The principles of treatment and management of disease under the theories outlined are ingenious and suggestive. The volume is

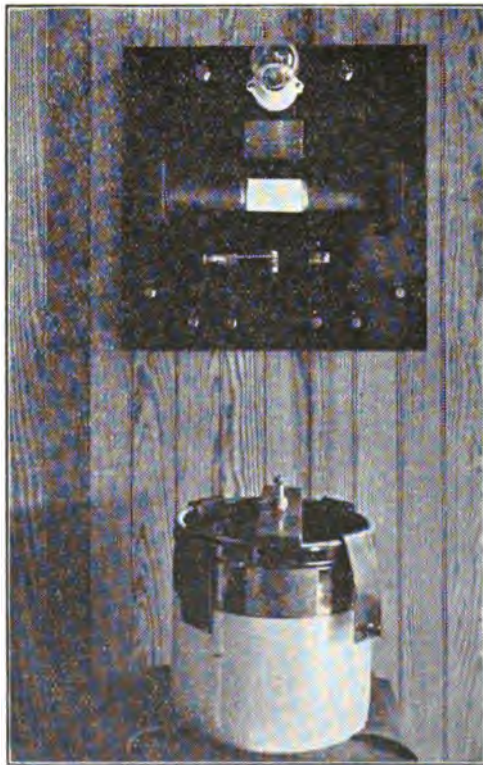
worthy the careful perusal of every earnest student of medical science. The realization of the author's honest convictions would revolutionize medical theory and practice.

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